Original Article

Effects of Video-Guided Digital Menstrual Exercise on Premenstrual Syndrome and Dysmenorrhea Among Adolescent Girls: A Quasi-Experimental Study

Devi Permata Sari[1], Sri Sat Titi Hamranani[1], Zahra Alfisyahrina[1], Supardi[1]

[1] Departement of Nursing, Faculty of Health and Technology, University of Muhammadiyah Klaten, Klaten, Central Java, Indonesia

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Correspondence

Devi Permata Sari; Departement of Nursing, Faculty of Health and Technology, University of Muhammadiyah Klaten, Klaten, Central Java, Indonesia

Email:

devisarimaternity@gmail.com

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ABSTRACT

Background: Adolescence is a transitional period of reproductive maturation in which many girls experience premenstrual syndrome and dysmenorrhea that can affect physical, psychological, and academic functioning. Video-guided digital menstrual exercise may help reduce these symptoms through relaxation and improved uterine circulation. However, evidence on nurse-led digital menstrual exercise remains limited; therefore, this study aimed to examine its effects on premenstrual syndrome symptoms and dysmenorrhea intensity among adolescent girls.

Methods: This quasi-experimental pretest–posttest control group study followed TREND guidelines. From 237 female students, 70 were selected through purposive sampling and assigned to intervention and control groups. The intervention was video-guided digital menstrual exercise, while outcomes were premenstrual syndrome and dysmenorrhea intensity measured using validated questionnaires and the Numeric Rating Scale (NRS). Data were analyzed using McNemar, Wilcoxon Signed Rank, and Mann–Whitney tests with $p < 0.05$.

Results: The intervention group showed a significant reduction in premenstrual syndrome symptoms, with 74.3% of participants reporting no premenstrual syndrome after the intervention video guided digital menstrual exercise program ($p < 0.001$). Dysmenorrhea intensity also significantly decreased, as 34.3% of participants reported no pain after the intervention, and a significant difference in pain intensity was observed between the intervention and control groups ($p < 0.001$). The results of the Mann–Whitney U test showed a statistically significant difference in pain intensity between the intervention and control groups ($p < 0.001$), with a very large effect size ($r = 0.86$).

Conclusion: Video-guided digital menstrual exercise is effective in reducing premenstrual syndrome symptoms and alleviating dysmenorrhea among adolescent girls with its effects plausibly explained through physiological and neuroendocrine mechanisms. This intervention can be recommended as a safe, practical, and non-pharmacological strategy to be implemented in school health programs to support adolescent reproductive health and improve daily functioning

Keywords: Adolescence; Dysmenorrhea; Premenstrual Syndrome; Exercise Therapy; Digital Health

Implications for Practice:

- Video-guided digital menstrual exercise can be implemented in adolescent care to reduce premenstrual syndrome symptoms and dysmenorrhea, thereby improving comfort and daily functioning.
- Clinicians and nurses may consider this intervention as a complementary non-pharmacological option in clinical decision-making for menstrual pain management.
- The findings support the integration of video-guided digital menstrual exercise programs into school-based and adolescent health policies to promote accessible and preventive reproductive health care

Introduction

Premenstrual syndrome (PMS) and dysmenorrhea are among the most prevalent menstrual health problems affecting adolescent girls and women of reproductive age worldwide. These conditions involve a combination of physical and psychological symptoms that significantly interfere with daily activities, academic performance, emotional well-being, and overall quality of life (Maity et al., 2022). Despite their high prevalence, premenstrual syndrome and dysmenorrhea are frequently underestimated and inadequately managed, particularly among adolescents, resulting in persistent discomfort and reduced functional capacity during menstruation (Durand et al., 2021).

Globally, adolescents constitute a substantial proportion of the population, with an estimated 1.2–1.3 billion individuals aged 10–19 years, representing approximately 16% of the world's population (WHO, 2022). Epidemiological evidence indicates that premenstrual syndrome and dysmenorrhea are highly prevalent among adolescents and women of reproductive age worldwide, although reported prevalence varies depending on diagnostic criteria and study context. Premenstrual syndrome have been reported in a majority of menstruating women, while dysmenorrhea affects more than half of women of reproductive age globally, including adolescents (WHO, 2022). In Asian regions, prevalence estimates are generally higher, with studies reporting premenstrual syndrome prevalence of approximately 60% and dysmenorrhea affecting over 80% of adolescents and women of reproductive age (WHO, 2018). In Indonesia, national reports similarly indicate a high burden of menstrual health problems, with premenstrual syndrome reported by approximately 90% of women of reproductive age and dysmenorrhea affecting more than 60% of adolescents (Lestari, 2024).

Clear disparities exist between high-income countries (HICs) and low- and middle-income countries (LMICs) in the management of premenstrual syndrome and dysmenorrhea. In HICs, adolescents generally have better access to reproductive health services, comprehensive menstrual health education, and evidence-based pain management options. In contrast, adolescents in LMICs, including Indonesia, often face limited access to adolescent-friendly health services, insufficient menstrual health education, and sociocultural barriers that hinder appropriate menstrual health management (Balis et al., 2025). Consequently, many adolescents in LMICs manage menstrual discomfort independently, frequently relying on self-medication or tolerating symptoms without adequate professional support (Zulimartin et al., 2025)

From a global public health perspective, menstrual-related disorders constitute an important concern due to their cumulative impact on adolescent health, educational attainment, and productivity(Sawyer et al., 2025). Adolescents experiencing premenstrual syndrome and dysmenorrhea often rely on pharmacological pain management, which may not always be

accessible, appropriate, or sustainable for long-term use (Nagy H, Carlson K, 2023). Therefore, the development of safe, effective, and accessible non-pharmacological interventions is essential to promote menstrual health equity, particularly in resource-limited settings.

Addressing premenstrual syndrome and dysmenorrhea is essential within nursing and public health practice, as these conditions directly affect adolescents' physical comfort, emotional stability, and academic engagement. Nurses play a crucial role in adolescent reproductive health through health promotion, early identification of menstrual problems, and implementation of non-pharmacological interventions. However, evidence-based, practical, and scalable nursing interventions particularly those that can be delivered in school and community settings remain limited, highlighting the need for innovative and accessible approaches (Punjani et al., 2020).

Previous studies have shown that physical exercise and relaxation-based interventions may reduce premenstrual syndrome and dysmenorrhea; however, findings remain inconsistent regarding the optimal type, duration, and mode of delivery, especially among adolescents (Koçak & Şevgin, 2025). Moreover, most existing studies focus on face-to-face interventions and examine premenstrual syndrome and dysmenorrhea separately, with limited integration of digital delivery methods and nursing theoretical frameworks.

This study is grounded in Orem's Self-Care Deficit Nursing Theory, which emphasizes the role of nursing in enhancing individuals' self-care agency. Premenstrual syndrome and dysmenorrhea may create a temporary self-care deficit among adolescents by limiting their ability to independently manage menstrual discomfort. Video-guided digital menstrual exercise is conceptualized as a supportive–educative nursing intervention that strengthens adolescents' self-care agency by promoting active engagement in symptom management, improving body awareness, and facilitating non-pharmacological regulation of pain and premenstrual syndrome (Wong et al., 2015). Through enhanced self-care capacity, adolescents are better equipped to manage both premenstrual syndrome and dysmenorrhea intensity.

This study is situated within the international literature on non-pharmacological and digital interventions for menstrual health. It addresses a gap in the literature by evaluating a theory-driven, video-guided menstrual exercise intervention grounded in physiological and neuroendocrine mechanisms, implemented through a school-based, quasi-experimental design among adolescent girls. This approach remains underexplored in existing digital and non-pharmacological menstrual health research. By utilizing low-cost digital delivery and existing school health structures, this study provides a scalable and contextually relevant intervention with particular value for Low- and Middle-Income Countries (LMICs) where access to pharmacological management may be limited.

Therefore, the objective of this study was to evaluate the effect of video-guided digital menstrual exercise on premenstrual syndrome symptoms and dysmenorrhea intensity among adolescent girls.

Methods

Study Design

This study employed a quasi-experimental design with an untreated control group and dependent pretest–posttest samples to examine the effect of video-guided digital menstrual exercise on premenstrual syndrome and dysmenorrhea intensity among adolescent girls. A quasi-

experimental design was selected because random assignment was not feasible in the school-based setting, where participants were allocated based on existing class groupings and ethical considerations related to withholding health education interventions. This design allowed for the evaluation of intervention effects under real-world conditions while maintaining methodological rigor through the use of a control group and pretest–posttest measurements. This quasi-experimental study was conducted and reported in accordance with the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) guidelines. In this study, the independent variable was video-guided digital menstrual exercise, while the dependent variables were premenstrual syndrome symptoms and dysmenorrhea pain intensity.

Participants

The study population consisted of 237 female high school students in Klaten Regency, Central Java, Indonesia. A total of 70 respondents were selected using purposive sampling based on predefined inclusion criteria and were divided equally into an intervention group and a control group. However, due to the limited number of eligible participants during the study period, only 35 participants were recruited per group. All eligible participants were included, and the study should therefore be considered exploratory. Effect sizes are reported to provide additional insight into the magnitude of observed differences. The inclusion criteria were female students who had experienced menstruation and had a body mass index. Participants who met the inclusion criteria were non-randomly allocated to the intervention and control groups using a class-based allocation procedure to minimize contamination between groups. No participants dropped out during the study period. All participants who were enrolled at baseline completed the intervention and were included in the final analysis.

The independent variable was video-guided digital menstrual exercise, while the dependent variables were premenstrual syndrome symptoms and dysmenorrhea pain intensity.

Instruments

Exercise observation sheet, used to monitor and document participants' adherence to the video-guided menstrual exercise program. The sheet recorded respondent identity (name, age, class) and the schedule of exercise implementation before and during menstruation.

The Premenstrual Syndrome Questionnaire, consisting of 20 items (15 favorable and 5 unfavorable questions), is used to assess the presence of premenstrual syndrome. The questionnaire demonstrated acceptable validity (r = 0.580) and reliability (Cronbach's alpha = 0.72). The Premenstrual Syndrome questionnaire was translated into Indonesian and culturally adapted. The translation was reviewed and finalized by a panel of experts in reproductive health to ensure clarity, cultural relevance, and content validity before use in the study. A pilot project was conducted with 30 adolescent participants to assess the validity of the translated Premenstrual Syndrome questionnaire.

Dysmenorrhea questionnaire, measured using a Numeric Rating Scale (NRS) to assess menstrual pain intensity. This instrument consisted of 11 statements, with validity coefficients ranging from 0.517 to 0.883 and high reliability (Cronbach's alpha = 0.947–0.954). The Dysmenorrhea questionnaire is freely available for research purposes and was used with proper citation of the source.

Video-guided digital menstrual exercise, a 30-minute instructional video

consisting of warm-up, core, and cool-down movements, designed to support independent and structured exercise practice among adolescents.

Intervention

The intervention aimed to enhance adolescents' self-care by teaching them video-guided digital menstrual exercises to manage premenstrual symptoms and menstrual pain. Respondents in the intervention group received guidance on the exercises, with each session supervised by trained research assistants to ensure correct performance and participant safety. Fidelity checks were conducted by observing a sample of sessions to confirm adherence to the exercise protocol. Safety monitoring included instructing participants to report any discomfort or adverse effects immediately. The procedure was as follows

The research procedure began with the selection of respondents according to the inclusion criteria. When eligible respondents exceeded the required sample size, 35 participants per group. Participants then provided informed consent and received an explanation of the video-guided digital menstrual exercise procedure.

Seven days before menstruation, respondents completed the pre-test premenstrual syndrome questionnaire, followed by participation in video-guided digital menstrual exercise for three consecutive days. Four days before menstruation, respondents completed the post-test premenstrual syndrome questionnaire.

On the first day of menstruation, respondents completed the pre-test NRS questionnaire, followed by another three-day session of video-guided digital menstrual exercise. On the fourth day of menstruation, respondents completed the post-test NRS questionnaire.

The control group followed the same measurement schedule but continued their usual daily activities without video-guided digital menstrual exercise.

Data Collection

Data were collected in May 2025 at senior high schools in Klaten Regency, Indonesia. The data collection process was conducted by the researchers, assisted by trained enumerators and school teachers who supported coordination, monitoring, and implementation of the intervention. Enumerators received brief training on study procedures, standardized data collection methods, and ethical considerations to ensure consistency. Data quality control measures included daily review of completed questionnaires and cross-checking entries for accuracy. Any missing data were addressed by following up with participants when possible. There were no missing data, as all participants completed the study and provided complete datasets.

Data Analysis

Data were analyzed using SPSS. Normality of continuous variables was assessed using the Shapiro–Wilk test. As the data were not normally distributed and the sample size was limited, non-parametric tests were used. The McNemar test was applied to assess changes in premenstrual syndrome symptoms before and after the intervention. At the same time, the Wilcoxon Signed Rank Test was used to evaluate differences in dysmenorrhea pain intensity. The Mann–Whitney U test was conducted to compare outcomes between the intervention and control groups. A p-value of < 0.05 was considered statistically significant.

Ethical Considerations

This study was conducted in accordance with ethical principles for

research involving human participants, including respect for autonomy, confidentiality, and voluntary participation and explicitly complied with the Declaration of Helsinki. Ethical approval was obtained from the Health Research Ethics Committee of the University of Muhammadiyah Klaten, with approval number no 014/KET/I.3.AU/F.5/IV/2025. Written informed consent was obtained from all participants before data collection, and permission was also secured from the participating schools. Participants' data were anonymized by assigning unique codes, and all identifiers were removed from the dataset to ensure confidentiality. Data were stored securely and used solely for research purposes. There were no missing data, as all participants completed the study and provided complete datasets.

Results

The study was conducted on adolescent girls in the intervention and control groups, each with 35 respondents. Several characteristics were identified, including age, age at first menstruation, and duration of menstruation, as shown in the table below:

Table 1. Characteristics of the Intervention and Control Groups

Variable	Intervention Group				Control Group			
	Min	Max	Mean	Standar Deviasi	Min	Max	Mean	Standar Deviasi
Age	16	18	16.74	0.505	16	18	16,98	0.511
Menarche	10	14	12.34	1.083	11	14	12,01	1.210
Duration of Menstruation	5	8	6.77	0.843	5	9	6,90	0.815

The characteristics of respondents in the intervention and control groups showed a relatively homogeneous profile. The mean age of participants in both groups was within late adolescence (16–18 years), with the average age at menarche ranging from approximately 12 to 13 years, and the mean duration of menstruation was around 6–7 days. The relatively small standard deviations across all variables indicate low data variability, suggesting that the baseline characteristics between the two groups were comparable and unlikely to confound the assessment of the intervention effects (**Table 1**).

Table 2. Normality and Homogeneity Test Results

Variabel	Statistik *Kolmogorov-Smirnov*	Sig. (p- value)	Levenne Statistic	Sig. (p- value)
Intensitas nyeri *dismenore pretest*	0,281	<0,001	5,566	0,021
Intensitas nyeri *dismenore pretest*	0,261	<0,001		

Table 3. Symptom of Premenstrual Syndrome in the Intervention Group and Control Group

Group	Premenstrual Syndrome	Pretest	Posttest	Asymp. Sig
		n	n	
Intervention	Experiencing symptoms of premenstrual syndrome	35	9	<0.001
	Not experiencing premenstrual syndrome symptoms	0	26	

Group	Premenstrual Syndrome	Pretest	Posttest	Asymp. Sig
		n	n	
Control	Experiencing symptoms of premenstrual syndrome	30	28	0.5
	Not experiencing premenstrual syndrome symptoms	5	7	

In the intervention group, the number of respondents experiencing premenstrual syndrome symptoms decreased from 35 at pretest to 9 at posttest, while the number of asymptomatic respondents increased to 26. This change was statistically significant (Asymp. Sig = <0.001), indicating a strong effect of the intervention (**Table 2**).

In contrast, the control group showed no significant change in premenstrual syndrome, with symptomatic respondents decreasing slightly from 30 to 28 (Asymp. Sig = 0.500). These findings confirm that the reduction in premenstrual syndrome occurred only in the intervention group, demonstrating the effectiveness of the intervention (**Table 3**).

Table 4. Bivariate Analysis of Pre–Post Pain Intensity Using the Wilcoxon Test and Between-Group Differences Using the Mann–Whitney Test

Group		Mean Rank	Sum of Rank	Asymp.Sig (2tailed)
Intervention Group	Negatif Rank	18.00	630.00	<0.001
	Positive Group	0.00	0.00	
Control Group	Negatif Rank	3.00	12.00	0.180
	Positive Group	3.00	3.00	

The Mann–Whitney test showed a Mann–Whitney U value of 30.000 and a Wilcoxon W value of 660.000, with a Z score of −7.203. The Asymp. Sig. (2-tailed) value was < 0.001, indicating a statistically significant difference between the groups.

The rank-based analysis showed a significant change in pain intensity within the intervention group, where all respondents demonstrated a negative rank with a mean rank of 18.00 and a sum of ranks of 630.00. The statistical test indicated a significant difference between pretest and posttest (Asymp. Sig. = <0.001), reflecting a consistent reduction in pain intensity following the intervention (**Table 4**).

In contrast, the control group exhibited minimal and inconsistent changes in pain intensity. Both negative and positive ranks were observed, with a low mean and sum of ranks. The difference between pretest and posttest in the control group was not statistically significant (Asymp. Sig. = 0.180).

The Mann–Whitney test comparing pain intensity between the intervention and control groups. The analysis revealed a statistically significant difference in pain intensity between the two groups (U = 30.000; Z = −7.203; Asymp. Sig. (2-tailed) =< 0.001).

These results indicate that pain intensity in the intervention group differed significantly from that in the control group, confirming the effectiveness of the intervention in reducing pain compared to standard care. An effect size (r) of 0.86 indicates a very strong intervention effect, suggesting that the difference in pain intensity between the intervention and control groups is not only statistically significant but also clinically and practically meaningful. This implies that the video-guided digital menstrual exercise produced a substantial and noticeable reduction in

menstrual pain intensity among adolescents, reflecting a real and impactful benefit rather than a trivial statistical difference.

Discussion

The findings of this study suggest that video-guided digital menstrual exercise is associated with reductions in premenstrual syndrome symptoms and pain intensity. Rather than reiterating numerical outcomes, the discussion focuses on the underlying physiological, contextual, and implementation-related mechanisms that may explain these effects. Regular menstrual exercise is known to influence the neuroendocrine system, particularly by enhancing the release of β-endorphins during physical activity. Increased endorphin levels act as natural analgesics, reducing pain perception and improving mood, which are core components of premenstrual syndrome (Xiang et al., 2025)

Regular menstrual exercise *has been associated with improvements* in premenstrual syndrome symptoms and dysmenorrhea, potentially through modulation of hormonal and inflammatory pathways involved in menstrual pain (Yosri et al., 2022). Physical activity stabilizes fluctuations in estrogen and progesterone, thereby reducing excessive prostaglandin synthesis and uterine hypercontractility that contribute to ischemia and pain s(Jin, S., Choi, J., & Lee, 2025) (Itani et al., 2022). Rhythmic muscle activity improves pelvic blood flow, which alleviates uterine ischemia and facilitates the removal of metabolic byproducts that sensitize pain receptors(Shahid et al., 2024). Regular menstrual exercise may suppress prostaglandin activity through improved hormonal balance and reduced inflammatory mediators, leading to decreased uterine hypercontractility and pain (Ryan, 2017).

Exercise-based interventions also influence pain perception through neuroendocrine mechanisms (Seo & Seo, 2025). The release of endogenous opioids, particularly β-endorphins, inhibits nociceptive transmission at both spinal and supraspinal levels. Video-guided digital delivery enhances adherence and stress regulation, leading to reduced activation of the hypothalamic–pituitary–adrenal (HPA) axis and lower cortisol levels (Caplin et al., 2021). Together, these physiological and neuroendocrine mechanisms explain the observed reduction in pain intensity following the intervention.

In contrast, the control group showed both negative and positive ranks with a low mean and sum of ranks, and no statistically significant difference between pretest and posttest. This pattern suggests the absence of systematic modulation of pain-related pathways, indicating that pain intensity fluctuations in the control group likely reflected natural variability rather than true physiological adaptation.

The present findings are consistent with a recent randomized controlled trial showing that regular exercise significantly reduces menstrual symptoms, fatigue, and sleep disturbances while increasing physical activity levels (Koçak & Şevgin, 2025). Accumulating evidence indicates that aerobic, stretching, and resistive exercises performed over 8–12 weeks can reduce menstrual pain through exercise-induced analgesia and hormonal modulation, particularly among adolescents and young women(Jaleel et al., 2022).

This study provides new evidence that video-guided digital menstrual exercise effectively reduces premenstrual syndrome and pain intensity through physiological mechanisms of pain modulation. The findings support existing neuroendocrine and biopsychosocial theories of premenstrual syndrome, demonstrating that structured physical activity remains

effective when delivered digitally. This study adds to the literature by introducing a scalable, accessible non-pharmacological intervention with potential implications for future research and clinical practice in menstrual health management.

Importantly, these findings should be interpreted within the context of low- and middle-income countries (LMICs), where access to menstrual health services and pharmacological pain management may be limited. In many LMIC settings, menstrual pain is often normalized, underreported, or managed with limited resources due to cultural taboos, financial constraints, and inadequate adolescent reproductive health education (Holmes et al., 2021). The video-guided digital menstrual exercise intervention offers a low-cost, scalable, and non-pharmacological alternative that can be integrated into existing school- or community-based health programs without requiring advanced infrastructure(Seo & Seo, 2025)

Cultural and system-level adaptability further strengthen the relevance of this intervention in LMIC contexts. Menstrual exercise can be culturally tailored by aligning movements, language, and educational content with local beliefs and norms surrounding menstruation (Okoro R N, Aluh D O, 2025). Digital delivery allows flexibility in timing and privacy, which is particularly important in cultures where open discussion of menstruation remains sensitive. At the system level, this intervention can be embedded into adolescent health promotion programs, school health units, or community nursing initiatives, reducing reliance on medication and supporting self-management strategies for menstrual health (Naderbagi et al., 2024).

Differences in findings across studies may be influenced by variations in participant age, contextual settings, and modes of intervention delivery. Adolescents and LMIC contexts may respond differently to non-pharmacological interventions, while video-based digital delivery may enhance adherence and consistency, thereby affecting study outcomes.

Implications and limitations

The findings of this study have important conceptual and practical implications for nursing science and menstrual health care. Conceptually, this study contributes to nursing theory by reinforcing the biopsychosocial framework of pain management, demonstrating that digitally delivered menstrual exercise can modulate physiological, psychological, and behavioral pathways involved in premenstrual syndrome. The findings extend non-pharmacological nursing interventions into the digital health domain, highlighting how self-managed, exercise-based strategies can enhance autonomy, self-efficacy, and symptom control among adolescents and young women. From a practical perspective, video-guided digital menstrual exercise represents a feasible, low-cost, and scalable intervention that can be integrated into nursing, midwifery, and adolescent reproductive health programs, particularly in resource-limited settings where access to supervised exercise or clinical services is constrained. This intervention aligns with preventive and promotive nursing roles, supporting community-based and school-based menstrual health initiatives.

However, these implications should be interpreted in light of several limitations, including the relatively small sample size, reliance on self-reported measures, and limited intervention duration, which may restrict generalizability and preclude conclusions about long-term effectiveness. Potential confounding factors such as diet, stress, and hormonal variability were not fully controlled, suggesting the need for future studies employing larger samples,

longer follow-up periods, and objective physiological indicators. Despite these limitations, the study provides meaningful theoretical insight and practical direction for advancing digital, non-pharmacological nursing interventions in menstrual health management.

Relevance to Practice

The findings indicate that video-guided digital menstrual exercise can be directly implemented by nurses as a simple, non-pharmacological strategy to reduce premenstrual syndrome. In school settings, nurses can integrate guided digital menstrual exercise into adolescent health education sessions to promote menstrual self-care and symptom management. In community nursing practice, this intervention can be introduced during health counseling at community health posts, with nurses providing initial guidance and encouraging independent practice using mobile devices. Midwives and nurses may also incorporate video guided digital menstrual exercise into routine menstrual health counseling to reinforce consistency and self-management. At the system level, this approach can be included in menstrual health promotion guidelines as a feasible and low-cost complement to existing educational interventions, particularly in resource-limited settings.

Conclusion

This study demonstrates that video guided digital menstrual exercise is effective in significantly reducing premenstrual syndrome and pain intensity. The intervention group showed a marked and statistically significant improvement compared to the control group, which exhibited no meaningful change. Beyond statistical significance, the magnitude of the observed effects indicates clear practical and clinical relevance, as the intervention resulted in a meaningful reduction in symptom burden that can enhance adolescents' daily functioning and quality of life. From both adolescent and maternal nursing perspectives, this intervention offers a feasible, low-cost, and scalable non-pharmacological strategy to support menstrual health education, symptom self-management, and early preventive care across the reproductive life course. The key takeaway is that digitally delivered menstrual exercise represents a practical, accessible, and evidence-based approach for managing premenstrual syndrome. Given its digital format, this intervention has strong potential for scale-up through school- and community-based nursing programs and warrants long-term evaluation to assess sustainability, adherence, and integration into routine reproductive health services. Future research should investigate the long-term effectiveness of this intervention and its applicability to broader and more diverse populations, including different age groups and care settings.

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CrediT Authorship Contributions Statement

Devi Permata Sari: Conceptualization, Methodology, Supervision, Writing - Original Draft

Sri Sat Titi Hamranani: Validation, Formal Analysis, Writing - Review & Editing

Supardi: Investigation, Resources, Data Curation

Zahra Alfisyahrina: Writing - Original Draft, Review & Editing, Visualization

Conflicts of Interest

There is no conflict of interest.

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Supplementary Materials

Supplementary File S1: Research Instrument contains the full questionnaire used for data collection.

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