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Evaluation of the effectiveness of a training program for coping with PMS symptoms based on IMB model in university students

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ABSTRACT

Premenstrual syndrome (PMS) is a common health problem that adversely affects young women's quality of life. This paper evaluated the effectiveness of a "Training Program for Coping with PMS Symptoms based on Information-Motivation-Behavioral Skills (IMB) model" in university nursing students. This controlled intervention study was conducted between September 2017 and February 2018. No sampling was performed. The goal was to include all students who met the inclusion criteria. The sample consisted of 95 first-year nursing students from two universities divided into two groups: intervention (n = 40) and control (n = 45) (power of 84.5%, p = .05, effect size = 0.45). The intervention group received the training, followed by individual motivational counseling first and second months after the training. The control group did not participate in the training program. The intervention group had more PMS symptoms coping behaviors (recognizing premenstrual change, performing regular exercises, relaxation techniques, pursuing a healthy diet, communicating with family and friends) than their counterparts in the control group after the training program (p < .05). The intervention group had higher Premenstrual Coping Measure scores (recognizing premenstrual changes, performing self-care, avoiding harm, communicating) after training program (p < .05). Although habits are hard to break, especially at young ages, the training helped university students adopt PMS coping behaviors.

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A training program; coping with PMS symptoms; Information-Motivation-Behavioral Skills model; university nursing students; women's health nursing

Introduction

Menstruation is a natural process that every woman goes through each month from puberty until menopause. Hormonal changes during the menstrual cycle cause anxiety, irritability, insomnia, confusion, weight gain, headache, breast tenderness, and skin problems in many women. The American College of Obstetrics and Gynecology (ACOG) defines premenstrual syndrome (PMS) as the presence of symptoms up to five days before menstruation for at least three menstrual cycles in a row, with complete resolution within four days after the onset of the period (ACOG 2015).

The prevalence of PMS worldwide is 48%, with France having the lowest (12%) and Iran the highest rate (98%) (Direkvand et al. 2014). Premenstrual syndrome is also common in Turkey, affecting almost half (49%) of women of reproductive age (Saglam and Basar 2019). The prevalence of PMS ranges from 58% (Acikgoz, Dayi, and Binbay 2017) to 91.8% (Goker et al. 2015), especially in young women.

The symptoms of PMS disrupt family and social relationships and cause anxiety, suicidal thoughts, violent behavior, and economic losses (Matsumoto, Asakura, and Hayashi 2013). The PMS also

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adversely affects young women's reproductive health and quality of life, resulting in absenteeism and low academic performance in students (Tolossa and Bekele 2014).

Individualized, holistic, and gradual approaches are becoming increasingly popular for the treatment of PMS. The first step toward PMS symptom relief should involve promoting self-screening and providing training and counseling on self-care, such as lifestyle changes, diet regulation, and coping strategies. The second step should involve implementing non-pharmacological methods, including complementary and alternative medicine treatments and cognitive behavioral therapy. Pharmacological strategies (hormonal, non-hormonal, and symptomatic treatments) are recommended if the problem persists (ACOG 2015; Green, O'Brien, and Panay 2017; Panay 2011).

Nurses help relieve PMS symptoms and improve quality of life. Especially in the first step, they provide structured training and counseling to promote lifestyle changes and PMS symptom relief (ACOG 2015; Green, O'Brien, and Panay 2017). However, only a handful of studies investigate the effect of training on PMS coping behaviors (Arıöz and Ege 2013; Ramya, Rupavani, and Bupathy 2014).

Model-based training is an effective method that helps people develop health-promoting behaviors (Barley and Lawson 2016). The Information-Motivation-Behavioral Skills (IMB) model is one of those approaches. People should first be trained to develop health-promoting behaviors and then offered counseling on problem-solving to help them put knowledge into practice (Fisher et al. 2002). The IMB model is used to treat chronic diseases and substance abuse, to prevent sexually transmitted infections, and to help people develop self-care behaviors (Konkle-Parker, Amico, and McKinney 2014; Peyman and Abdollahi 2016; Shell et al. 2011; Zarani et al. 2012). The IMB model was the method of choice in this study because it is a descriptive, clear, concise, concrete, practical, and current method with the advantages of earlier models. However, there is no published research investigating the effectiveness of IMB model-based training in coping with PMS symptoms. Turkey does not have a policy or a guide concerning PMS coping strategies, and universities do not have a standardized program.

This paper evaluated the effectiveness of a training program for coping with PMS symptoms based on the IMB model in university students.

Materials and methods

Research type and sampling

This controlled intervention study was conducted between September 2017 and February 2018. The intervention population consisted of 111 first-year nursing students of the nursing department of a public university in Ankara/Turkey. The university could not be randomly selected for accessibility of studensts. The control population consisted of 116 first-year nursing students at different public university. The university randomly selected from other public universities in Ankara/Turkey for minimize interaction between the intervention and control groups. No sampling was performed. The goal was to include all students who met the inclusion criteria. The sample consisted of 95 first-year students divided into two groups: intervention (n = 40) and control (n = 45). A power analysis was performed using G*Power (version, 3.1.9.7). A posthoc power analysis was conducted to identify sampling adequacy. The results showed a post-hoc power of 84.5% with an effect size of 0.45 (Faul et al. 2007).

Criteria for inclusion

The inclusion criteria were (1) PMS symptoms (marking at least one of the first 14 items of the Premenstrual Symptoms Screening Tool), (2) regular periods every 24 to 35 days (Spierings and Padamsee 2015), (3) no pregnancy or lactation in the past 12 months, (4) no mental disorder (depression, panic attack, schizophrenia, etc.), (5) not undergoing medical treatment for chronic

disease, (6) not on oral contraceptives, (7) not having taken nursing courses before, (8) being a first-year nursing student, (9) literate in Turkish, and (10) voluntary.

Criteria for exclusion

The exclusion criteria were (1) missing/incomplete data, (2) not having participated in the training and individual counseling sessions, and (3) withdrawal from the study.

Data collection

The Premenstrual Symptoms Screening Tool (PSST) was developed by Steiner, Macdougall, and Brown (2003) to identify PMS symptoms. The tool is a four-point Likert-type scale consisting of 22 items. Marking at least one of the first 14 items indicates PMS symptoms (Steiner, Macdougall, and Brown 2003). The tool was adapted to Turkish by Özdel et al. (2015). It had a Cronbach's alpha (α) of 0.92 in our study.

The 31-item *Individual Information Form (IIF)* was prepared by the researchers based on three experts' feedback to determine participants' characteristics and PMS coping behaviors (ACOG 2015; Direkvand et al. 2014; Goker et al. 2015; Tolossa and Bekele 2014 Green, O'Brien, and Panay 2017; Panay 2011; Khajehei 2015; Read, Perz, and Ussher 2014).

According to the IIF, regular exercise is engaging in 150 minutes of physical activity per week (World Health Organization 2010); a healthy diet is a low fat and sugar-free diet rich in protein, pulp, complex carbohydrates, omega-3, iron, dairy products, or vegetables, and eating little and often (ACOG 2015); an excessive salt consumer is someone who adds salt without tasting the food; adequate sleep is sleeping at least eight hours a day (World Health Organization 2004). According to the IIF, a student uses stress coping strategies if she does breathing and relaxation exercises, takes a bath, pursues her hobbies, has massages, or receives cognitive behavioral therapy (Khajehei 2015).

The Premenstrual Coping Measure (PCM) was developed by Read, Perz, and Ussher (2014) to determine women's capacity to cope with PMS symptoms. It is a five-point Likert-type measure consisting of five subscales: "avoiding harm" (α = 0.89), "awareness and acceptance of premenstrual change" (α = 0.86), "adjusting energy" (α = 0.73), "self-care" (α = 0.81), and "communicating" (α = 0.68) (Read, Perz, and Ussher 2014). The total score is not taken into account for evaluation. Higher subscale scores indicate better PMS coping behaviors. Abay (2019) adapted the PCM to Turkish and reported the Cronbach's alpha of the subscales "avoiding harm," "awareness and acceptance of premenstrual change," "adjusting energy," "self-care," and "communicating" as 0.88, 0.89, 0.75, 0.83, and 0.86, respectively.

The PMS Symptoms Diary (PMSD) is used to record the severity of PMS symptoms (1: none, 6: severe) in a month. It consists of 11 items; anxious, irritable, difficulty concentrating, tired, increased appetite, slept more, etc. It is recommended by the Royal College of Obstetricians and Gynecologists to monitor PMS symptoms (Green, O'Brien, and Panay 2017).

The Coping with PMS Symptoms Book developed by the researchers consisted of five training-related sections (ACOG 2015; Direkvand et al. 2014; Goker et al. 2015; Tolossa and Bekele 2014; Green, O'Brien, and Panay 2017; Panay 2011; Khajehei 2015; Read, Perz, and Ussher 2014). Each section specified session-related topics, learning objectives, methods, and duration. The book had numerous examples and pictures and a dictionary section that helped with intelligibility. It was revised based on expert feedback (n = 7) and then published in color.

Procedure

Figure 1 shows the research flowchart. Fifty-seven students (out of 116) met the inclusion criteria for the control group and completed the pretest IIF and PCM. Three students were excluded because they had missing data. Nine students withdrew from the study. Therefore, the final control sample consisted of 45 students. The control group did not participate in the training program.

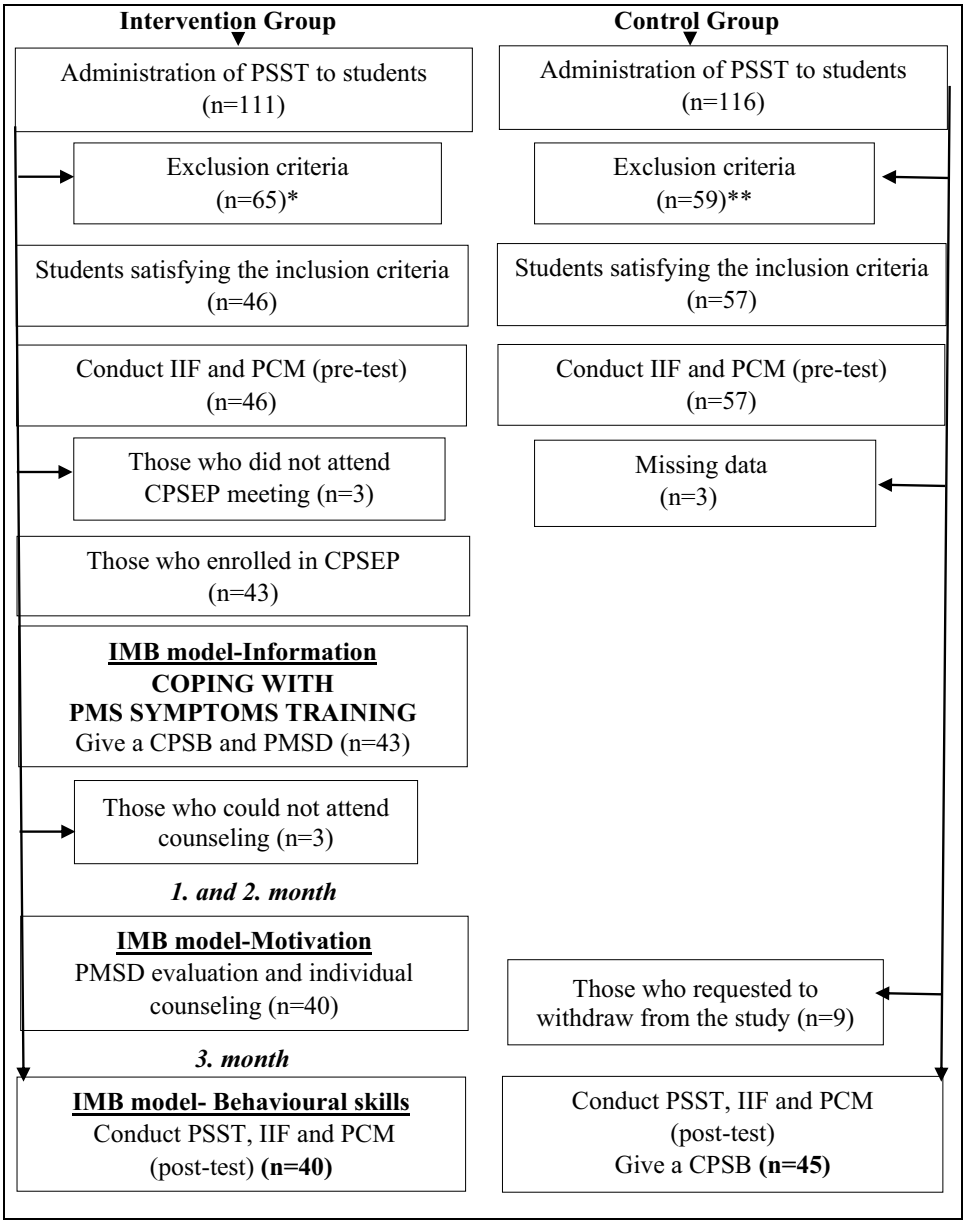


Figure 1. The flowchart of the study. PSST: Premenstrual Symptoms Screening Tool, IIF: Individual Information Form, PCM: Premenstrual Coping Measure, CPSEP: Coping with PMS Symptoms Education Program, CPSB: Coping with PMS Symptoms Book, PMSD: PMS Symptoms Diary.*Absence of PSM symptoms (n = 2), irregular period (n = 26), not volunteering to participate in the study (n = 10), not volunteering to participate in CPSEP (n = 27).**Irregular period (n = 19), not volunteering to participate in the study (n = 40).

Forty-six students (out of 111) met the inclusion criteria for the intervention group and completed the pretest IIF and PCM. Afterward, they were contacted to schedule a meeting the following day. Forty-three students attended the meeting and were informed of the training. Three training sessions were scheduled at their convenience. All students were added to a WhatsApp Group for ease of communication.

The intervention group attended the training, which consisted of three stages: (1) information, (2) motivation, and (3) behavioral skills development.

The first stage: Expert researchers trained the intervention group on ways of coping with PMS symptoms. The 200-min training consisted of five sections: (1) physiology of menstruation, (2) awareness-raising and self-care in coping with PMS symptoms, (3) lifestyle and dietary changes to cope with PMS symptoms, (4) complementary and alternative medicine treatments in coping with PMS symptoms and methods of coping with stress, and (5) medical and surgical treatment approach to coping with PMS symptoms. The training involved a PowerPoint presentation and interactive teaching methods, such as demonstration, team-play, models, videos, and card games. Participants were taught how to record the PMSD and were asked to record their PMS symptoms on their diaries for a month. They were asked to bring their diaries to the individual counseling sessions at the end of the first and second months. After the training, the intervention group participants were handed out the diaries and Coping with PMS Symptoms Books. The training took three sessions (first; n = 12, second; n = 16, third; n = 15).

The second stage: The intervention group participants were provided with individual counseling on coping with PMS symptoms one and two months after the training. Each counseling lasted about 30 minutes. During counseling, participants' PMSDs were evaluated to determine their PMS symptoms, and recommendations were made for PMS symptom relief per the "Guidelines for Motivational Interviewing for Coping with PMS Symptoms." The principles of motivational interviewing (expressing empathy, developing discrepancy, avoiding argument, and supporting self-efficacy) were applied. Participants were also provided with reminders and were allowed in question-and-answer dialogs and discussions on WhatsApp. Three students were excluded from the analysis because they did not attend the counseling. Therefore, the training was completed with 40 students.

The third stage: Both intervention and control groups completed the PSST, IIF, and PCM as posttest three months after the training. ($n_{\text{INTERVENTION GROUP(IG)}} = 40$, $n_{\text{CONTROL GROUP(CG)}} = 45$).

Ethical considerations

Permission was obtained from the developers of the PCM and PSST, and the institution. The study was approved by an ethics committee (No: 08, Date: 10.09.2017). Participation was voluntary. Written consent was obtained from those who agreed to participate. All interviews were conducted at participants' convenience. There was no conflict of interest between the researchers and participants. In controlled intervention studies, it is ethically recommended that the control group also have access to the intervention at the end of the research (Yildirim Beyazit University, Social and Human Sciences Ethics Committee, 2021). Therefore, we handed out the Coping with PMS Symptoms Books to the control group participants at the end of the study.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, IBM version 23, Chicago, IL, USA) at a significance level of 0.05. Number and percentage were used for categorical variables. Mean ($\bar{x}$) and standard deviation (SD) were used for numerical variables. The Shapiro Wilk's test was used for normality testing. The data were analyzed using independent and dependent sample t-tests and the Mann Whitney U, Wilcoxon, Chi-Square, and McNemar's tests.

Results

Individual characteristics

The intervention and control groups had a mean age of 19.65 ± 2.007 (min = 18, max = 31) and 19.42 ± 0.583 (min = 18, max = 21), respectively ($p > .05$). The two groups did not significantly differ

by residential area, place of residence for the last month, family type, parents' education, income, body mass index, distribution of periods, and PMS symptoms ($p > .05$).

Behaviors for coping with PMS symptoms

There was no statistically significant difference in the pretest PCM scores between the intervention and control groups ($p > .05$). However, the intervention group had significantly higher posttest "regular exercise" (IG = 57.5%, CG = 26.7%), "healthy diet" (IG = 70.0%, CG = 42.2%), "communicating with family and friends" (IG = 67.5%, CG = 37.8%), and "strategies for coping with stress" percentages (IG = 65.0%, CG = 17.8%) than the control group ($p < .05$) (see Table 1).

The intervention group participants' posttest "regular exercise" (pretest=20.0%; posttest=57.5%), "healthy diet" (pretest=45.0%; posttest=70.0%), and "strategies for coping with stress" (pretest=30.0%; posttest=65.0%) percentages were significantly higher than their pretest percentages ($p < .05$) (see Table 1).

Distribution of PCM subscale mean scores

There was a significant difference in the mean pretest "communicating" subscale scores between the intervention and control groups ($\bar{x}_{IG} = 9.90 \pm 3.020$, $\bar{x}_{CG} = 11.84 \pm 4.492$) ($p < .05$). However, there was no significant difference in the mean pretest mean "avoiding harm," "awareness and acceptance of premenstrual change," "self-care," and "adjusting energy" subscale scores between the two groups ($p > .05$). The intervention group had a significantly higher posttest "awareness and acceptance of premenstrual change" subscale score than the control group ($\bar{x}_{IG} = 39.10 \pm 6.050$, $\bar{x}_{CG} = 35.78 \pm 8.034$) ($p < .05$). The intervention group also had higher posttest "avoiding harm," "self-care," and "communicating" subscale scores than the control group, but the difference was statistically insignificant (see Table 2).

The intervention group participants' mean posttest "avoiding harm" subscale score (22.55 ± 6.563) was significantly higher than their mean pretest score (19.15 ± 6.974) ($p < .05$). Their mean posttest "awareness and acceptance of premenstrual change" (39.10 ± 6.050), "self-care" (15.75 ± 3.706), and "communicating" (12.90 ± 4.056) subscale scores were significantly higher than their mean pretest scores ($p < .05$). However, there was no statistically significant difference between the intervention group participants' mean pretest and posttest "adjusting energy" subscale scores ($p > .05$). The control group participants' mean pretest and posttest PCM subscale scores did not significantly differ from each other ($p > .05$) (see Table 2).

Discussion

This study was evaluated the effectiveness of a training program for coping with PMS symptoms based on the IMB model in university nursing students. The intervention group received the training, followed by individual counseling. The control group did not receive the training program. The primary outcome measure was whether participants adopted the target behaviors (regular exercise, healthy diet, communicating with family and friends, relaxation exercises, and strategies for stress relief) to cope with PMS symptoms. After the training program, the intervention group had significantly more PMS coping behaviors than the control group ($p < .05$). Moreover, the training program made them more aware of premenstrual changes, encouraged them to adopt harm-avoidance strategies and self-care behaviors, and helped them communicate better with family and friends ($p < .05$).

Recognizing PMS symptoms is one of the first steps toward adopting behaviors to cope with them (Read, Perz, and Ussher 2014). The majority (90%) of Spanish women do not seek treatment for PMS symptoms because they consider them natural (Lete, Duenas, and Serrano 2011). However, women can cope with PMS symptoms and improve their quality of life. One session of our training focused on raising participants' awareness of PMS symptoms, while the individual counseling addressed

Table 1. Comparison of intervention and control group & pretest and posttest regarding behaviors for coping with PMS symptoms.

	Pretest			Posttest			Pretest/posttest IG (n = 40)	Pretest/posttest CG (n = 45)
Behaviors for coping with PMS symptoms	IG (n = 40) n (%)	CG (n = 45) n (%)	Analysis[a]	IG (n = 40) n (%)	CG (n = 45) n (%)	Analysis[a]	Analysis[b]	Analysis[b]
Regular exercise (at least 150 minutes/per week)								
Yes	8 (20.0)	8 (17.8)	$x^2 = 0.068$	23 (57.5)	12 (26.7)	$x^2 = 8.312$	$p = .001$**	$p = .454$
No	32 (80.0)	37 (82.2)	$p = .794$	17 (42.5)	33 (73.3)	$p = .004$*		
Healthy diet (a low fat and sugar free diet rich in protein, omega-3, iron, etc.)								
Yes	18 (45.0)	16 (35.6)	$x^2 = 0.787$	28 (70.0)	19 (42.2)	$x^2 = 6.610$	$p = .013$*	$p = .581$
No	22 (55.0)	29 (64.4)	$p = .375$	12 (30.0)	26 (57.8)	$p = .010$*		
Excessive salt consumption (without tasting the food)								
Yes	11 (27.5)	5 (11.1)	$x^2 = 3.722$	7 (17.5)	8 (17.8)	$x^2 = 0.001$	$p = .219$	$p = .250$
No	29 (72.5)	40 (88.9)	$p = .054$	33 (82.5)	37 (82.2)	$p = .973$		
Adequate sleep (at least 8 hours/a day)								
Yes	14 (35.0)	18 (40.0)	$x^2 = 0.226$	19 (47.5)	15 (33.3)	$x^2 = 1.771$	$p = .302$	$p = .549$
No	26 (65.0)	27 (60.0)	$p = .635$	21 (52.5)	30 (66.7)	$p = .183$		
Communicating with family and friends								
Yes	22 (55.0)	17 (37.8)	$x^2 = 2.530$	27 (67.5)	17 (37.8)	$x^2 = 7.492$	$p = .227$	$p = 1.000$
No	18 (45.0)	28 (62.2)	$p = .112$	13 (32.5)	28 (62.2)	$p = .006$*		
Strategies for coping with stress (breathing and relaxation exercises, bathe, massages, etc.)								
Yes	12 (30.0)	9 (20.0)	$x^2 = 1.138$	26 (65.0)	8 (17.8)	$x^2 = 19.676$	$p = .001$**	$p = 1.000$
No	28 (70.0)	36 (80.0)	$p = .286$	14 (35.0)	37 (82.2)	$p = .000$**		

Abbreviation: PMS: premenstrual sendrom, IG: intervetion group, CG: control group.
[a]Chi-square analysis, percentage of column. [b]Mc Nemar analysis, percentage of column. *$p < .05$ **$p < .001$.

Table 2. Comparison of intervention and control group & pretest and posttest regarding the PCM subscale scores.

	Pretest			Posttest		
	IG (n = 40)	CG (n = 45)		IG (n = 40)	CG (n = 45)	
The PCM's Subscales	$\bar{x}\pm$ SS	$\bar{x}$ ± SS	Analysis[a]	$\bar{x}$ ± SS	$\bar{x}$ ± SS	Analysis[a]
Avoiding harm	19.15 ± 6.974	21.80 ± 5.790	p = .059	22.55 ± 6.563	21.47 ± 5.679	p = .417
Awareness and acceptance of premenstrual change	34.00 ± 5.760	36.33 ± 5.364	p = .076	39.10 ± 6.050	35.78 ± 8.034	p = .024*
Adjusting energy	8.23 ± 2.796	8.44 ± 2.817	p = .720	7.45 ± 2.470	8.29 ± 2.660	p = .174
Self-care	14.13 ± 3.443	15.29 ± 3.123	p = .072	15.75 ± 3.706	14.84 ± 3.097	p = .143
Communicating	9.90 ± 3.020	11.84 ± 4.492	p = .027*	12.90 ± 4.056	12.56 ± 3.997	p = .922
The PCM's Subscales	IG (n = 40)			CG (n = 45)		
	Pretest	Posttest		Pretest	Posttest	
	$\bar{x}$ ± SS	$\bar{x}$ ± SS	Analysis[b]	$\bar{x}$ ± SS	$\bar{x}$ ± SS	Analysis[b]
Avoiding harm	19.15 ± 6.974	22.55 ± 6.563	p = .001**	21.80 ± 5.790	21.47 ± 5.679	p = .666
Awareness and acceptance of premenstrual change	34.00 ± 5.760	39.10 ± 6.050	p = .000**	36.33 ± 5.364	35.78 ± 8.034	p = .680
Adjusting energy	8.23 ± 2.796	7.45 ± 2.470	p = .094	8.44 ± 2.817	8.29 ± 2.660	p = .855
Self-care	14.13 ± 3.443	15.75 ± 3.706	p = .047*	15.29 ± 3.123	14.84 ± 3.097	p = .508
Communicating	9.90 ± 3.020	12.90 ± 4.056	p = .000**	11.84 ± 4.492	12.56 ± 3.997	p = .402

Abbreviation: PCM: Premenstrual Coping Measure, IG: intervetion group, CG: control group.
[a]Mann Whitney U Test, percentage of column. [b]Wilcoxon Test, percentage of column. *$p < 0.05$ **$p < 0.001$.

premenstrual changes and experiences that they might be going through. Keeping a diary helped them with self-monitorization. They recognized PMS symptoms more than their counterparts in the control group ($p < .05$). These results suggest that the training program can be used to raise students' awareness of PMS symptoms and help them accept changes during that period.

Women who avoid self-harming habits and environments are better at managing PMS symptoms (Read, Perz, and Ussher 2014). One of the objectives of the training program was to help the intervention group participants acquire healthy consumption habits to better cope with PMS symptoms. The results showed that they developed more self-avoidance behaviors than their counterparts in the control group after the training program ($p < .05$). However, the training program had no impact on their tobacco, caffeine, and salt habits ($p > .05$). It takes time, effort, and motivation to overcome addictions. Therefore, future studies should involve long-term follow-up sessions and consider the development of strategies in the motivation stage of the model.

It takes energy to meet menstrual needs. A menstrual cycle leads to a rise in progesterone levels and a reduction in allopregnanolone concentrations, which is a metabolite of progesterone that increases gamma-aminobutyric acid concentrations and decreases response to melatonin, reduces the quality of sleep, and causes insomnia and fatigue (Jehan et al. 2016). The subscale "adjusting energy" is concerned with reducing social and physical activity and focusing less on others' needs (Read, Perz, and Ussher 2014). There was no significant difference in "adjusting energy" scores between the intervention and control groups after the training program ($p > .05$). People are engaged in more social and physical activities during adolescence, which may be a barrier to energy management (Foubister et al. 2021).

Some of the self-care methods for coping with PMS are focusing on one's own needs and engaging in relaxing activities, such as resting, taking a bath, reading, having a massage, etc. (Read, Perz, and Ussher 2014). Stress makes PMS symptoms more severe (Namavar Jahromi, Pakmehr, and Hagh-Shenas 2011). Perceived stress level is an indicator of the severity of PMS symptoms (Lee and Im 2017). Women can use relaxation methods to manage stress and have milder PMS symptoms (Simsek Kucukkelepce et al. 2021; Tsai 2016). The intervention group participants were informed that they could do breathing and relaxation exercises (meditation, yoga, etc.), take a bath, engage in hobbies, and have massages to cope with stress. They were provided with counseling for encouragement and support. They were also given the contact details of some meditation and yoga centers. They displayed more stress coping behaviors than their counterparts in the control group ($p < .05$). They also had a higher posttest "self-care" score than the pretest score ($p < .05$). Most university students live far from family, try to adapt to new ways of doing things, and generally have too many classes and exams. All these things cause stress and a high prevalence of PMS (Goker et al. 2015). Therefore, universities should set up IMB-based counseling centers to help students develop strategies and adopt behaviors to cope with stress.

Eating is one way of coping with PMS. Food cravings, especially for sweets, due to hormonal fluctuations in the luteal phase may adversely affect diet (Dahlgren and Qvigstad 2018). Women with PMS are recommended to consume a healthy diet with fresh vegetables and fruits and avoid processed foods, sugar, salt, and caffeine (Aguilar-Aguilar 2021). The intervention group participants were briefed and motivated to develop healthy eating habits. After the training program, the intervention group was more careful than the control group about eating little and often and having a low-fat and sugar-free diet rich in protein, pulp, complex carbohydrates, omega-3, iron, dairy products, and vegetables ($p < .05$). Eating disorders are common in university students (Barry, Sonneville, and Leung 2021). Therefore, IMB-based nutrition programs can be an effective way to introduce healthy eating habits to them.

Physical activity is another self-care behavior that results in emotional stress relief and improved mood. Research also shows that physical activity increases energy, appetite, and concentration and reduces menstrual cramps, low-back pain, fluid retention, and breast tenderness (Çitil and Kaya 2020; Dilbaz and Aksan 2021). The intervention group participants were informed of the university facilities, such as the walking track, swimming pool, sports center, etc. During individual counseling, they

reported that regular exercise helped them with PMS symptoms. They were also encouraged to adhere to the exercise programs they signed up for. They performed more regular exercise than their counterparts in the control group ($p < .05$).

The study had two strengths. First, the same researcher provided the training program and counseling to minimize possible researcher-induced inconsistencies. Second, the intervention and control groups were composed of nursing students from different universities to prevent the groups from interacting, which increased the reliability of the results

The study had three limitations. First, we did not check whether the control group participants had attended any training program on PMS coping techniques (seminars, conferences, blogs, etc.) during the study. Therefore, future studies should address this issue. Second, participants were not blinded to group assignment. Third, the sample consisted only of nursing students, and therefore, the results cannot be generalized to all university students or the whole population.

In conclusion, although habits are hard to break, especially at young ages, the training program helped female university students adopt behaviors to cope with PMS symptoms in many aspects. Therefore, authorities should take research evidence into account when developing guides and standardized programs. Moreover, universities should establish IMB-based counseling centers to help students develop strategies and adopt behaviors to cope with PMS symptoms. Longer follow-up studies are warranted to better understand the long-term effects of the model. Future studies should also utilize biomarkers to corroborate the results.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

Abay, H. 2019. Evaluation of the effectiveness of coping with premenstrual symptoms education program based on information-motivation-behavioural skills (IMB) Model in University Students. PhD diss., Ankara Yıldırım Beyazıt University Health Sciences Institute. (in Turkish).

Acikgoz, A., A. Dayi, and T. Binbay. 2017. Prevalence of premenstrual syndrome and its relationship to depressive symptoms in first-year university students. *Saudi Medical Journal* 38 (11):1125–31. doi:10.15537/smj.2017.11.20526.

Aguilar-Aguilar, E. 2021. Desórdenes menstruales: Lo que sabemos de la terapia dietética-nutricional [Menstrual disorders: What we know about dietary-nutritional therapy]. *Nutrición Hospitalaria* 37 (2):52–56. doi:10.20960/nh.03358.

The American College of Obstetricians and Gynecologists (ACOG). 2015. Premenstrual syndrome (PMS). Accessed March 23, 2020. https://www.acog.org/patient-resources/faqs/gynecologic-problems/premenstrual-syndrome .

Arıöz, A., and E. Ege. 2013. Premenstrüel sendrom sorunu olan üniversite öğrencilerinde, semptomların kontrolü ve yaşam kalitesinin artırılmasında eğitimin etkinliği [Effectiveness of education in increasing the quality of life and the control of premenstrual syndrome on university students who have premenstrual syndrome problem]. *Genel Tıp Dergisi* 23 (3):63–69. in Turkish.

Barley, E., and V. Lawson. 2016. Using health psychology to help patients: Theories of behaviour change. *British Journal of Nursing* 25 (16):924–30. doi:10.12968/bjon.2016.25.16.924.

Barry, M. R., K. R. Sonneville, and C. W. Leung. 2021. Students with food insecurity are more likely to screen positive for an eating disorder at a large, public university in the midwest. *Journal of the Academy of Nutrition and Dietetics* S2212–2672.00073-3. doi: 10.1016/j.jand.2021.01.025.

Çitil, E. T., and N. Kaya. 2020. Effect of pilates exercises on premenstrual syndrome symptoms: A quasi-experimental study. *Complementary Therapies in Medicine* 57:1026232. doi:10.1016/j.ctim.2020.102623.

Dahlgren, C. L., and E. Qvigstad. 2018. Eating disorders in premenstrual dysphoric disorder: A neuroendocrinological pathway to the pathogenesis and treatment of binge eating. *Journal of Eating Disorders* 6:35–41. doi:10.1186/s40337-018-0222-2.

Dilbaz, B., and A. Aksan. 2021. Premenstrual syndrome, a common but underrated entity: Review of the clinical literature. *Journal Of The Turkish-German Gynecological Association*. (Online ahead of print). doi:10.4274/jtgga.galenos.2021.2020.0133.

Direkvand, A. M., K. Sayehmiri, A. Delpisheh, and S. Kaikhavandi. 2014. Epidemiology of premenstrual syndrome (PMS)-a systematic review and meta-analysis study. *Journal of Clinical and Diagnostic Research: JCDR* 8 (2):106–09. doi:10.7860/JCDR/2014/8024.402.

Faul, F., E. Erdfelder, A. G. Lang, and A. Buchner. 2007. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods* 39 (2):175–91. doi:10.3758/bf03193146.

Fisher, J. D., W. A. Fisher, A. D. Bryan, and S. J. Misovich. 2002. Information-motivation-behavioral skills model-based HIV risk behavior change intervention for inner-city high school youth. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association* 21 (2):177–86. doi:10.1037/0278-6133.21.2.177.

Foubister, C., E. M. F. Van Sluijs, A. Vignoles, P. Wilkinson, E. C. F. Wilson, C. H. D. Croxson, H. E. Brown, and K. Corder. 2021. The school policy, social, and physical environment and change in adolescent physical activity: An exploratory analysis using the LASSO. *PLoS One* 16 (4):e0249328. doi:10.1371/journal.pone.0249328.

Goker, A., B. A. Ulkumen, F. Aktenk, and N. Ikiz. 2015. Premenstrual syndrome in Turkish medical students and their quality of life. *Journal of Obstetrics and Gynaecology: The Journal of the Institute of Obstetrics and Gynaecology* 35 (3):275–78. doi:10.3109/01443615.2014.948820.

Green, L. J., P. M. S. O'Brien, N. Panay, M. Craig, and on behalf of the Royal College of Obstetricians and Gynaecologists. 2017. Management of premenstrual syndrome. *BJOG: An International Journal of Obstetrics and Gynaecology*. 124 (3):73–105. doi:10.1111/1471-0528.14260.

Jehan, S., E. Auguste, M. Hussain, S. R. Pandi-Perumal, A. Brzezinski, R. Gupta, H. Attarian, G. Jean-Louis, and S. I. McFarlane. 2016. Sleep and premenstrual syndrome. *Journal of Sleep Medicine and Disorders* 3 (5):1–17.

Khajehei, M. 2015. Aetiology, diagnosis and management of premenstrual syndrome. *Journal of Pain & Relief* 4:1–4. doi:10.4172/21670846.1000193.

Konkle-Parker, D. J., K. R. Amico, and V. E. McKinney. 2014. Effects of an intervention addressing information, motivation, and behavioral skills on HIV care adherence in a southern clinic cohort. *AIDS Care* 26 (6):674–83. doi:10.1080/09540121.2013.845283.

Lee, Y., and E. O. Im. 2017. Stress and premenstrual symptoms among Korean women studying in the U.S. and South Korea: A longitudinal web-based study. *Women & Health* 57 (6):665–84. doi:10.1080/03630242.2016.1181139.

Lete, I., J. Duenas, and I. Serrano. 2011. Attitudes of Spanish women toward premenstrual syndrome-premenstrual dysphoric disorder. *European Journal of Obstetrics, Gynecology, and Reproductive Biology* 159 (1):115–18. doi:10.1016/j.ejogrb.2011.06.041.

Matsumoto, T., H. Asakura, and T. Hayashi. 2013. Biopsychosocial aspects of premenstrual syndrome and premenstrual dysphoric disorder. *Gynecological Endocrinology: The Official Journal of the International Society of Gynecological Endocrinology* 29 (1):67–73. doi:10.3109/09513590.2012.705383.

Namavar Jahromi, B., S. Pakmehr, and H. Hagh-Shenas. 2011. Work stress, premenstrual syndrome and dysphoric disorder: Are there any associations? *Iranian Red Crescent Medical Journal* 13 (3):199–202.

Özdel, K., A. Kervancıoğlu, İ. Taymur, and C. Efe. 2015. Premenstrual Symptom Screening Tool: A useful tool for DSM-5 premenstrual dysphoric disorder. *Journal of Clinical and Analytical Medicine* 6:581–85. doi:10.4328/JCAM.2314.

Panay, N. 2011. Management of premenstrual syndrome: Evidence-based guidelines. *Obstetrics, Gynaecology & Reproductive Medicine* 21 (8):221–28. doi:10.1016/j.ogrm.2011.05.005.

Peyman, N., and M. Abdollahi. 2016. Using of information–motivation–behavioral skills model on nutritional behaviors in controlling anemia among girl students. *Journal of Research & Health* 7 (2):736–44. doi:10.18869/acadpub.jrh.7.2.736.

Ramya, S., K. Rupavani, and A. Bupathy. 2014. Effect of educational program on premenstrual syndrome in adolescent school girls. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* 3 (1):168–71. doi:10.5455/2320-1770.ijrcog20140333.

Read, J. R., J. Perz, and J. M. Ussher. 2014. Ways of coping with premenstrual change: Development and validation of a premenstrual coping measure. *BMC Womens Health* 14 (1):1–15. doi:10.1186/1472-6874-14-1.

Saglam, H. Y., and F. Basar. 2019. The relationship between premenstrual syndrome and anger. *Pakistan Journal of Medical Sciences* 35 (2):515–20. doi:10.12669/pjms.35.2.232.

Shell, D. F., I. M. Newman, C. M. Perry, and A. R. Folsom. 2011. Changing intentions to use smokeless tobacco: An application of the IMB model. *American Journal of Health Behavior* 35 (5):568–80. doi:10.5993/ajhb.35.5.6.

Simsek Kucukkelepce, D., H. Unver, G. Nacar, and S. T. Tashan. 2021. The effects of acupressure and yoga for coping with premenstrual syndromes on premenstrual symptoms and quality of life. *Complementary Therapies in Clinical Practice* 42:101282. doi:10.1016/j.ctcp.2020.101282.

Spierings, E. L. H., and A. Padamsee. 2015. Menstrual-cycle and menstruation disorders in episodic vs chronic migraine: An exploratory study. *Pain Medicine* 16 (7):1426–32. doi:10.1111/pme.12788.

Steiner, M., M. Macdougall, and E. Brown. 2003. The premenstrual symptoms screening tool (PSST) for clinicians. *Archives of Women's Mental Health* 6 (3):203–09. doi:10.1007/s00737-003-0018-4.

Tolossa, F. W., and M. L. Bekele. 2014. Prevalence, impacts and medical managements of premenstrual syndrome among female students: Cross-sectional study in college of health sciences, Mekelle University, Mekelle, Northern Ethiopia. *BMC Women's Health* 29:52–61. doi:10.1186/1472-6874-14-52.

Tsai, S. Y. 2016. Effect of yoga exercise on premenstrual symptoms among female employees in Taiwan. *International Journal of Environmental Research and Public Health* 13 (7):1–11. doi:10.3390/ijerph13070721.

World Health Organization. 2004. WHO technical meeting on sleep and health. Accessed March 27, 2020. http://www.euro.who.int/__data/assets/pdf_file/0008/114101/E84683.pdf .

World Health Organization. 2010. Global recommendations on physical activity for health. Accessed March 27, 2020. https://apps.who.int/iris/bitstream/handle/10665/44399/9789241599979_eng.pdf;jsessionid=894D4CE8C006EEC1EE80988A36C1DA09?sequence=1 .

Yildirim Beyazit University. 2021. Social and human sciences ethics committee. Accessed April 9, 2021. https://aybu.edu.tr/sbetik/ .

Zarani, F., M. A. Besharat, G. Sarami, and S. Sadeghian. 2012. An information-motivation-behavioral skills (IMB) model-based intervention for CABG patients. *International Journal of Behavioral Medicine* 19 (4):543–49. doi:10.1007/s12529-011-9193-2.