

Original article

Prevalence and associated factors of premenstrual syndrome and premenstrual dysphoric disorder among physical therapy internship students in Bangkok and surrounding areas

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Abstract

Background: Premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) are common disorders affecting the health and daily life of reproductive-age women. Nevertheless, the study on PMS and PMDD among Thai physical therapy students is still lacking.

Objectives: To investigate the prevalence and associated factors for moderate to severe PMS and PMDD among undergraduate physical therapy internship students in Bangkok metropolis and the surrounding areas.

Methods: A cross-sectional descriptive study was conducted in 256 physical therapy students in three randomly selected universities from August to December 2022. The subjects were asked to complete self-administered questionnaires included: 1) Personal and educational information; 2) medical and menstrual-related information; 3) Lifestyles information; 4) Premenstrual Symptoms screening tool (PSST) - Thai version; 5) Patient health questionnaire (PHQ-9) - Thai version; 6) Suanprung Stress Test-20 (SPST-20); and 7) World Health Organization Quality of Life Brief-Thai (WHOQOL-BREF-THAI). The collected data were analyzed using descriptive and inferential statistics.

Results: The prevalence of moderate to severe PMS and PMDD was 31.3% and 6.6%, respectively. According to logistic regression analysis, moderate to severe PMS was significantly associated with the presence of medical illnesses ($P = 0.006$), premenstrual bloating ($P = 0.036$), diarrhea during menstruation ($P = 0.022$), dizziness during menstruation ($P = 0.012$), having high to severe level of stress from SPST - 20 ($P = 0.035$), and having depression ($P < 0.001$), whereas no factors were significantly associated with PMDD when using logistic regression analysis.

Conclusion: According to the study, 37.9% of physical therapy students had moderate to severe PMS and PMDD. As a result, these students must be concerned about physical, emotional, and behavioral premenstrual symptoms for the sake of their health, internship performance, and overall quality of life.

Keywords: Physical therapy students, premenstrual dysphoric disorder, premenstrual syndrome.

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Premenstrual syndrome (PMS) is a syndrome of physical, emotional, and behavioral symptoms that occur a week before the onset of menstruation and diminish within a few days afterwards.⁽¹⁾ Bloating, breast tenderness, dizziness, weight gain, sleeplessness, eating more, hyperactivity, irritability, anxiety, melancholy, and mood swings are most common symptoms.^(2, 3) These conditions are characterized as mild to moderately severe PMS.⁽³⁾ However, if the symptoms are severe enough to interfere with quality of life, work, society, and interpersonal relationships, this condition is known as premenstrual dysphoric disorder (PMDD),⁽³⁾ and it is characterized by a markedly depressed mood, marked anxiety, marked affective lability, and marked irritability or increased interpersonal conflicts.⁽⁴⁾

Premenstrual syndrome is a prevalent health issue in women of reproductive age, particularly those aged 15 to 49 years. Among reproductive-age women, the pooled prevalence of PMS was 47.8%⁽⁵⁾, while the prevalence of PMDD was at 3.0% - 8.0%.⁽⁶⁾ According to previous studies in various medical personnel and other population such as professional nurses, medical students, nursing students, university students, major depression patients, and mood and anxiety disorders patients reported several factors associated with PMS and PMDD including stress⁽⁷⁾, younger age⁽⁸⁾, coffee consumption⁽⁸⁾, some medication use⁽⁹⁾, irregularity of the menstrual cycle⁽⁹⁾, low physical activity⁽¹⁰⁾, and numerous pains that occur both before and during menstruation.^(7 - 9) In addition to causing physical, emotional, and behavioral concerns, it has a variety of other impacts on daily life. The incidence of PMS and PMDD was reported to cause students to have frequent absences from classes and examinations⁽¹¹⁾, lower exam scores^(11, 12), and affect quality of life⁽¹³⁾ in all physical, psychological, social relationship, and environment domains.⁽¹⁴⁾ The study of PMDD in patients diagnosed major depressive disorder discovered that the patients experienced multiple exacerbations of depressive symptoms during the premenstrual period.⁽¹⁵⁾ This demonstrates how premenstrual syndrome affects women's health and daily life activities.

Physical therapy internship students are members of the medical personnel who treat and care for patients. Several duties and pressures, such as treating patients, presenting case studies, conducting research, and taking exams, can have an impact on mental health, physical fatigue, and quality of life. Physical

strength is essential to caring for patients, as is the mental ability to deal with pressure from patients and supervisors. Because female physical therapy students currently constitute the majority of the faculty, physical, mental, or hormonal changes during menstrual cycle may have an impact on performance. Nevertheless, no prior research on PMS and PMDD in female physical therapy students has been conducted in Thailand. As a result, examining the prevalence and associated factors may be beneficial for medical personnel in preventing, mitigating, and reducing the consequences of PMS and PMDD in undergraduate physical therapy internship students who may eventually become physical therapists.

The purposes of this study were to examine the prevalence and associated factors for moderate to severe PMS and PMDD among undergraduate physical therapy internship students in Bangkok metropolis and the surrounding areas.

Materials and methods

A cross-sectional descriptive study was collected from August to December 2022. This study has been approved by the Institutional Review Board, Faculty of Medicine, Chulalongkorn University (IRB no. 0206/65). Written informed consent was obtained from each subject.

Subjects

The study was conducted among physical therapy internship students. The sample size was calculated from a population of approximately 710 female third- and fourth-year physical therapy students from the seven universities in Bangkok and the surrounding areas in the academic year 2022. The sample size was then calculated to be 256 students using Taro Yamane's (1970) formula at a 95% confidence level. The target universities were selected by using simple random sampling, the lottery method. Mahidol University, Huachiew Chalermprakiet University, and Chulalongkorn University were selected at random.

The questionnaires were collected from three randomly selected universities until the predicted sample size of 256 was reached. There were 78 (30.5%) students from Mahidol University, 88 (34.4%) students from Huachiew Chalermprakiet University, and 90 (35.2%) students from Chulalongkorn University. The data for the study were gathered with the permission of the Department of Physical Therapy of each university. The subjects were given extensive

verbal explanations and an information sheet about the topic and objectives of the study, then completed the consent form before starting the questionnaire. Participation in this study was voluntary and anonymous. The subjects could complete the questionnaire with no restrictions and could withdraw from the study at any time. The inclusion criteria were female over the age of 18, undergraduate physical therapy third- and fourth-year students, and the ability to speak, read, and write in Thai.

Data collection was done using a self-administered questionnaire

The questionnaire was divided into 7 sections: 1) Personal and educational information consists of 11 questions about age, years in university, university, accumulated grade point average (GPAX), religion, income, habitat, class absence, exam absence, and internship absence; 2) Biological information consists of 6 questions about weight, height, history of medical illness, medication use, menstrual cycle, and contraception; 3) Lifestyles information, which developed by researchers, consists of 5 questions about consumption, exercise, and sleep quality; 4) Premenstrual symptoms screening tool (PSST) - Thai version, which translated and developed by Rattanachaiyanont M, *et al.* with Cronbach's alpha coefficient > 0.9 , consists of 19 questions divided into 2 sections: emotional and physical symptoms, and symptom consequences. McMaster University established the initial PSST, which was based on DSM-IV criteria. In this study, the Thai PSST was used to diagnose moderate to severe PMS and PMDD; 5) Patient health questionnaire (PHQ-9) - Thai version, which translated and developed by Lortrakul M, *et al.* with 84.0% sensitivity and 77.0% specificity, consists of 9 items regarding depressed symptoms and severity in the last two weeks. The Thai PHQ-9 was used to measure depression, with a score of 9 or higher indicating depression; 6) Suanprung stress test-20 (SPST-20) is a 20-item questionnaire designed to assess stress symptoms, which developed by Mahatnirunkul S, *et al.* with Cronbach's alpha coefficient > 0.7 and significantly associated with Electromyography (EMG) at 95% confidence interval. There are four stress interpretation levels: mild, moderate, high, and severe; and 7) World health

organization quality of life brief - Thai (WHOQOL-BREF-THAI), which developed by Mahatnirunkul S, *et al.* with Cronbach's alpha coefficient > 0.8 . The WHOQOL-BREF-THAI is a 26-item questionnaire used to measure overall quality of life as well as four domains: physical domain, psychological domain, social relationships, and environment.

Statistical analysis

The collected data were analyzed using SPSS version 28.0. Descriptive statistics were used to define the prevalence of moderate to severe PMS and PMDD, as well as subjects' general characteristics including frequency, percent, means, and standard deviation. To determine the association of factors associated with moderate to severe PMS and PMDD, inferential statistics such as Pearson's Chi-square, Fisher's exact test, and unpaired *t* - test were used. The significant factors associated with moderate to severe PMS were determined using binary logistic regression. $P < 0.05$ was considered as statistical significance.

Results

According to PSST, the prevalence of "moderate to severe PMS" and "PMDD" among the studied population were 80/256 (31.3%) and 17/256 (6.6%) respectively. The subjects in the study were 21.2 ± 1.0 years old on average. There were 130 (50.8%) third year students and 126 (49.2%) fourth year students in total. The mean body mass index (BMI) of the study subjects was 21.6 ± 4.1 , and 119 (50.6%) had normal BMI (18.5 - 23.0 kg/m²). The sociodemographic characteristics are available in **Table 1**.

Among the subjects, age at menarche typically began at 11 - 14 years old [219 (85.9%)], with a mean of 12.3 ± 1.4 . The usual length of menstrual cycle was 21 - 35 days [209 (86.7%)], with a mean of 28.7 ± 7.6 , while the usual duration of bleeding was 3 - 5 days per cycle [140 (54.9%)] followed by the days of > 6 per cycle [112 (43.9%)], with a mean of 5.6 ± 2.0 . During menstruation, the average number of sanitary pads used was 3 - 5 pads per day [164 (66.1%)], with a mean of 3.3 ± 2.4 (**Table 1**).

Table 1. Characteristics of study subjects.

Characteristics (n = 256)		N	Percentage	Mean ± SD
Age	≤ 20 years	62	24.2	21.2 ± 1.0
	> 20 years	194	75.8	
Years in University	3 rd year	130	50.8	
	4 th year	126	49.2	
GPAX	≤ 3.00	88	38.6	3.1 ± 0.5
	> 3.00	140	61.4	
Income	≤ 10,000 Bath/month	188	87.0	7,929.6 ± 3,781.5
	> 10,000 Bath/month	28	13.0	
Current habitat	Bangkok/surrounding areas	216	84.7	
	Other provinces	39	15.3	
BMI (kg/m²)	< 18.5 (Underweight)	54	21.2	21.6 ± 4.1
	18.5 - 23.0 (Normal)	129	50.6	
	23.0 - 25.0 (Overweight)	33	12.9	
	≥ 25.0 (Obesity)	39	15.3	
Class absence during premenstrual period		17	6.6	
Internship absence during premenstrual period		3	1.2	
Medical history				
History of medical illnesses		55	21.5	
History of psychiatric illnesses		5	2.0	
Medication used		28	10.9	
Menstrual histories				
Age at menarche (years)	< 11	18	7.1	12.3 ± 1.4
	11 - 14	219	85.9	
	> 14	18	7.1	
Length of menstrual cycle (days)	< 21	16	6.6	28.7 ± 7.6
	21 - 35	209	86.7	
	> 35	16	6.6	
Duration of bleeding (days/cycle)	< 3	3	1.2	5.6 ± 2.0
	3 - 5	140	54.9	
	> 6	112	43.9	
Pads use per day (pads/day)	< 3	80	32.3	3.3 ± 2.4
	3 - 5	164	66.1	
	> 5	4	1.6	
Regularity of menstruation	Regular cycle	153	60.7	
	Irregular cycle	99	39.3	
Lifestyles				
Total caffeine consumption (cups/day)	< 1	52	20.3	1.6 ± 1.1
	≥ 1	204	79.7	
Alcohol use (cups/week)	< 1	220	85.9	0.4 ± 1.3
	≥ 1	36	14.1	
Analgesic use (times/week)	None	205	80.1	
	< 1	4	1.9	
Exercise (session/week)	≥ 1	46	18.0	0.3 ± 0.8
	None	99	38.7	
	< 1	84	32.8	
Total sleep time per day (hours)	< 6	69	27.4	3.0 ± 1.0
	≥ 6	183	72.2	
Insomnia		76	29.8	

Table 2. Associated factors of moderate to severe premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) using Chi - square.

Variables (n = 256)	Moderate to severe PMS group (n = 80)		PMDD group (n = 17)	
	χ^2	P - value	χ^2	P - value
University			10.193	0.006**
Medical illnesses	15.040	<0.001**		
Medication use	9.811	0.002**		
Analgesic use	7.409	0.006**		
Irregularity of menstrual cycle	7.034	0.008**		
Premenstrual symptoms				
GI disturbance	7.186	0.007**		
Diarrhea	5.446	0.020*		
Constipation	7.045	0.008**	5.773	0.024**
Bloating	4.292	0.038*		
Back pain	7.847	0.005**		
Abdominal cramps	8.050	0.005**		
Symptoms during menstruation				
GI disturbance	11.563	<0.001**		
Diarrhea	6.521	0.011*		
Constipation			15.050	<0.001***
Back pain	4.312	0.038*		
Abdominal cramps	8.227	0.004**		
Dizziness	10.771	0.001**	6.495	0.020**
Psychosocial factors				
Depression	33.554	<0.001**		
Stress	10.716	0.001**	12.738	<0.001**
Quality of life	6.343	0.031**		

* $P < 0.05$, ** $P < 0.01$, ^aFisher's Exact Test

Based on medical, menstrual, and lifestyle variables, history of medical illness, medication use, analgesic use, and irregularity of menstrual cycle were reported to be significantly associated with moderate to severe PMS ($P < 0.001$, $P = 0.002$, $P = 0.006$, $P = 0.008$, respectively). While the only factor found to be significantly related to PMDD was the university ($P = 0.006$) (Table 2).

Premenstrual physical symptoms reported to be significantly associated with moderate to severe PMS were gastro-intestinal (GI) disturbance ($P = 0.007$), diarrhea ($P = 0.020$), constipation ($P = 0.008$), bloating ($P = 0.038$), back pain ($P = 0.005$), and abdominal cramps ($P = 0.005$). While premenstrual constipation was the only symptom found to be significantly associated with PMDD ($P = 0.024$) (Table 2).

During menstruation, physical symptoms found to be significantly associated with moderate to severe PMS were GI disturbance ($P < 0.001$), diarrhea ($P = 0.011$), back pain ($P = 0.038$), abdominal cramps

($P = 0.004$), and dizziness ($P = 0.001$). Constipation and dizziness were found to be significantly associated with PMDD ($P < 0.001$, $P = 0.020$, respectively) (Table 2).

In terms of psychosocial factors, depression and quality of life were reported to be significantly associated with moderate to severe PMS ($P < 0.001$, $P = 0.031$, respectively), and stress was found to be significant associated factor with both moderate to severe PMS ($P = 0.001$) and PMDD ($P < 0.001$), (Table 2).

Under unpaired *t* - test analysis, a comparison of mean differences in menstrual cycle and lifestyles data of diagnosed moderate to severe PMS with no moderate to severe PMS groups found mean of age at menarche, caffeinated soft drink consumption, total caffeine consumption, and amount of analgesic use were significantly different ($P = 0.038$, $P = 0.036$, $P = 0.016$, $P = 0.010$, respectively). The mean of associated psychological factors found to be

significantly different between diagnosed moderate to severe PMS and no moderate to severe PMS groups were depression score ($P < 0.001$), stress score ($P < 0.001$), overall quality of life score ($P = 0.011$), quality of life in physical domain score ($P = 0.047$), quality of life in psychological domain score ($P < 0.001$), and quality of life in environment domain score ($P = 0.023$). Using a similar analytic method, a study of mean differences between diagnosed PMDD and no PMDD groups revealed that the following characteristics were significantly different: age at menarche ($P = 0.024$), tea consumption ($P = 0.015$), amount of exercise ($P = 0.020$), depression score

($P = 0.005$), and stress score ($P < 0.001$) (**Table 3**).

According to binary logistic regression analysis, there are six significant associated factors that increase the likelihood of experiencing moderate to severe PMS. The related factors were the subjects who had medical illnesses (OR = 2.799, 95% CI = 1.337 - 5.862), premenstrual bloating (OR = 2.090, 95% CI = 1.049 - 4.162), diarrhea during menstruation (OR = 2.135, 95% CI = 1.115 - 4.088), dizziness during menstruation (OR = 2.393, 95% CI = 1.209 - 4.735), high to severe stress (OR = 2.555, 95% CI = 1.068 - 6.111), and high depression score (OR = 1.220, 95% CI = 1.128 - 1.320) (**Table 4**).

Table 3. Associated factors of moderate to severe premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) using t -test.

Variables (n = 256)	Moderate to severe PMS group (n = 80)		PMDD group (n = 17)	
	t	P -value	t	P -value
Age at menarche (years)	2.083	0.038*	2.269	0.024*
Tea consumption (cups/day)			-2.640	0.015*
Soft drink consumption (cups/day)	-2.105	0.036*		
Total caffeine consumption (cups/day)	-2.415	0.016*		
Amount of analgesic use (times/week)	-2.623	0.010*		
Amount of exercise (sessions/week)			-2.372	0.020*
Psychosocial factors				
Depression score (PHQ-9)	-7.122	<0.001**	-2.843	0.005**
Stress score (SPST-20)	-4.288	<0.001**	-4.654	<0.001**
Quality of life in overall score (WHOQOL-BREF-THAI)	2.573	0.011*		
Quality of life in physical domain score (WHOQOL-BREF-THAI)	1.994	0.047*		
Quality of life in psychological domain score (WHOQOL-BREF-THAI)	3.759	<0.001**		
Quality of life in environment score (WHOQOL-BREF-THAI)	2.279	0.023*		

* $P < 0.05$, ** $P < 0.01$

Table 4. Associated factors of moderate to severe premenstrual syndrome (PMS) using binary logistic regression.

Variables	Adjusted OR	95% CI	P -value
Presence of medical illnesses	2.799	1.337-5.862	0.006**
Premenstrual bloating	2.090	1.049-4.162	0.036*
Diarrhea during menstruation	2.135	1.115-4.088	0.022*
Dizziness during menstruation	2.393	1.209-4.735	0.012*
High to severe stress	2.555	1.068-6.111	0.035*
Depression	1.220	1.128-1.320	<0.001**

* $P < 0.05$, ** $P < 0.01$

Discussion

According to the studied population, the prevalence of moderate to severe PMS was found at 31.3%, which is consistent with previous domestic and international studies (25.1% - 64.9%)^(5, 8, 9, 11, 13, 15), whereas the prevalence of PMDD was found at 6.6%, which is consistent with previous domestic and international studies (2.4% - 24.0%).^(6, 9, 15, 16) The results of each study varied greatly due to the differences in age, ethnicity, characteristics, and lifestyle factors.

According to demographic characteristics, Chulalongkorn University was shown to be the only factor associated with PMDD. Because the native habitat of practically all physical therapy students at Chulalongkorn University is Bangkok and the surrounding areas (61.1%), which is consistent with the study of Wood C, *et al.*⁽¹⁷⁾, it was discovered that country of birth in the urban environment influenced menstrual pain and premenstrual tension.

In terms of medical and menstrual data, various factors have been found to be significantly associated with moderate to severe PMS and PMDD, and the associations were found in previous studies. The history of medical illness, medication use, and irregularity of menstrual cycle were significantly associated with moderate to severe PMS, according to a study by Dumrongpiwat N, *et al.*⁽⁹⁾ Age at menarche of this studied population was 12.3 ± 1.4 years old similar as the study of Elnagar M, *et al.*⁽¹⁸⁾, which their studied population started menstruation at the age of 13.0 ± 1.5 years old. The most common physical symptoms significantly associated with PMS were diarrhea, bloating, abdominal cramps, back pain, and headache, which is consistent with the study of Dumrongpiwat N, *et al.*⁽⁹⁾ and Tolossa FW, *et al.*⁽¹¹⁾ In addition, GI disturbance was significantly associated with moderate to severe PMS, while constipation and dizziness were significantly associated with both moderate to severe PMS and PMDD. These physical symptoms can be described by changes in the luteal phase, during which progesterone levels drop and the endometrium produces prostaglandins, hormone-like substances that aid in uterine contraction, constrict uterine blood vessels, and promote inflammation. Therefore, prostaglandins may induce several types of pain before and during menstruation.

According to lifestyles data, the significantly associated factors with moderate to severe PMS and

PMDD were caffeinated soft drink, total caffeine, and tea consumption, which not consistent with the study of Rasheed P, *et al.*⁽¹⁹⁾ and Purdue-Smithe AC, *et al.*⁽²⁰⁾ Their studies were shown that caffeinated cola and tea were insignificant with premenstrual symptoms⁽¹⁹⁾, and total caffeine intake was not associated with PMS.⁽²⁰⁾ This research was a study on the consumption of caffeine beverages by the number of cups consumed per day; therefore, there may be a difference in the level of caffeine consumed in each type of beverage.⁽²¹⁾ Analgesic use was the factor significantly associated with moderate to severe PMS, according to a study by Tolossa FW, *et al.*⁽¹¹⁾ It was found that the most common treatment modality used for PMS was pain killers (36.4%), therefore analgesics may be used to reduce pain and symptoms of PMS. Exercise was significantly associated with PMDD, which consistent with a study of Al-Shahrani AM, *et al.*⁽¹³⁾ Exercise can raise endorphin levels while decreasing cortisol levels, which can alleviate pain and stress. Aerobic exercise has been demonstrated to improve premenstrual emotional symptoms and is recommended for people suffering from PMS.⁽²²⁾

Based on psychological factors, depression was found to be significantly associated with both moderate to severe PMS and PMDD, according to a study of Thaweeksiri M, *et al.*⁽¹⁵⁾ It was found that patients diagnosed with major depressive disorder experienced an increase in depressive symptoms during the premenstrual period.⁽¹⁵⁾ Depression is associated with the neurotransmitter serotonin. Lower serotonin levels affect mood, cognition, appetite, and behavior in the same way that estrogen levels are reduced during the luteal phase.⁽²³⁾ The second significant factor with moderate to severe PMS and PMDD was stress, which consistent with a study of Henkaew W, *et al.*⁽⁷⁾ Stress can increase cortisol production by the adrenal gland. There was a change in the hypothalamus-pituitary-adrenal (HPA-axis) and an increase in cortisol levels in the luteal phase in women with PMDD⁽²³⁾, which is consistent with an increase in cortisol levels under stress. Furthermore, overall quality of life was found to be significant with moderate to severe PMS. Through the study of individual domains for quality of life, physical, psychological, and environment domains were found to be significant with moderate to severe PMS. It was found consistent with a study of Victor FF, *et al.*⁽¹⁴⁾, which reported that the environment domain in quality of life was associated with PMS, and quality of life in physical and

psychological domains were associated with PMDD. Because of the impacts of premenstrual syndrome, which produces physical, emotional, and behavioral changes that affect several aspects of women's health, this results in limitations in daily life activities and a lack of awareness of their quality of life.⁽¹⁴⁾

The benefits of these research results for determining prevalence and associated factors are beneficial in raising awareness of moderate to severe PMS and PMDD among physical therapy internship students. In addition, to apply discovered knowledge to develop recommendations for the prevention, mitigation, and treatment of premenstrual symptoms.

The limitations of this study were that it was conducted among physical therapy internship students only in Bangkok and the surrounding areas, therefore, the results may not be representative of all Thai physical therapy students. Therefore, differences in culture and other aspects such as consumption, lifestyle, and activities should be considered before applying the results. Furthermore, because the population with PMDD is very small, logistic regression analysis may not be able to identify the factors that significantly associated with PMDD. Also, because this was a cross-sectional study, it cannot establish if the related factors are causative.

Conclusion

According to the Thai version of the PSST, over one-third of the female physical therapy students experienced moderate to severe PMS and PMDD. Moreover, there are various factors that are associated with both moderate to severe PMS and PMDD. Therefore, these students must be concerned about premenstrual symptoms that are physical, emotional, and behavioral. It may suggest that more information on premenstrual syndrome be made available to students for the benefit of their physical and mental health, internship performance, and overall quality of life.

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Conflict of interest statement

Each of the authors has completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

The present review is based on the reference cited. Further details, opinions, and interpretation are available from the corresponding authors on reasonable request.

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