

To analyze how Premenstrual Syndrome (PMS) impacts female students' academic performance

WING YAN YIP

SHENZHEN HONGKONG
PUIKIU COILEGE LONGHUA
XINYI SCHOOL
Email: yipwingyan34@gmail.com
region: HONGKONG
Postal code: 518116

Abstract:

This study aimed to examine the impact of premenstrual syndrome (PMS) on the academic performance of female students. While premenstrual syndrome is common, its influence on academic outcomes is often overlooked in the educational sector. This research employs a mixed-method approach, including a literature review and a questionnaire survey. A total of 130 valid responses were analyzed, with the questionnaire inquiring about symptom frequency, the degree to which symptoms disrupted daily studies, and students' awareness of available support options. The data were analyzed using correlation and chi-square tests to assess whether symptom severity was associated with academic performance. Findings indicate that over 95% of respondents experienced at least one PMS symptom, and 67.88% of female students reported that PMS caused moderate to severe interference with their academic activities. Correlation analysis showed a significant positive relationship between symptom severity and academic disruption ($r = 0.551$, $p < 0.01$). The chi-square test further confirmed a significant association between PMS symptoms and academic interference. This study concludes that PMS significantly and measurably affects academic performance. Improving menstrual health education and school support systems could help lessen PMS's impact on students' academic success.

Keywords: Premenstrual Syndrome; Academic Performance; Female Students; Questionnaire Survey; Help-Seeking Behaviour

1. Introduction

Premenstrual syndrome (PMS) is defined as at least one out of fourteen symptoms registered in the fifth

text edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5). Clinical symptoms are serious enough to interfere with daily functioning, including academic and cognitive performance, rather

than representing temporary discomfort.

Epidemiological studies show that many adolescents have moderate to severe premenstrual symptoms.¹ Adolescence is a crucial and vulnerable period, both psychologically and physiologically. However, research into adolescent PMS or premenstrual anxiety disorder (PMDD) is currently scarce. Adolescence and early adulthood are critical for female students' education and development. Good concentration, emotional regulation, and language skills are essential for academic success. However, common physiological conditions like PMS can disrupt these key abilities. PMS can cause symptoms such as depression, anxiety, anger outbursts, and pain. This may lead to absenteeism or reluctance to disclose discomfort due to shame, which worsens the impact.²

Numerous studies have shown that PMS and related hormonal imbalances can affect students' academic performance. Despite this, the academic consequences of PMS have received comparatively limited attention within educational research. In addition, the questionnaire survey showed that compared with the high incidence and significant impact of PMS among Chinese female students, they lack awareness of premenstrual syndrome and lack access to support.

This paper aims to show that PMS is a common but often overlooked factor that affects the academic performance of female students. First, the study will use existing literature and survey data to determine PMS's prevalence among students and its specific impact on academic performance. Next, it will analyze the key pathways for these effects. Finally, based on gaps identified in awareness and support, the paper will suggest practical recommendations for educational institutions. These suggestions include providing health education or creating flexible leave and rest policies to reduce PMS's negative impact and advance equity in the educational environment.

2. Literature Review

2.1 Definitions and diagnostic criteria of PMS

The American College of Obstetricians and Gynecologists (ACOG) define PMS as a clinical condition characterized by cyclical affective and somatic symptoms. These symptoms must be severe enough to cause dysfunction in social, academic, or work performance and unrelated to any organic disease.³ The diagnostic criteria established by ACOG require the presence of at least one affective

symptom (including angry outbursts, anxiety, confusion, depression, irritability or social withdrawal) and one somatic symptom (including abdominal bloating, breast tenderness or swelling, headache, joint or muscle pain, swelling of extremities or weight gain), with mandatory temporal characteristics symptoms must appear during the late luteal phase, resolve within four days after the onset of menstruation, and occur in three consecutive menstrual cycles.⁴ A more severe and rigorously defined variant, PMDD has been formally recommended by the expert working group responsible for revising the DSM-5 for inclusion in the chapter on Mood Disorders as a separate diagnostic category.⁵ The criteria require at least five of eleven specific symptoms, including at least one core affective symptom for example depressed mood, anxiety, or affective instability.⁶

Crucially, the proposed criteria also require that the symptoms be associated with clinically significant distress or interference with work, school, usual social activities, or relationships with others.⁷ This explicit identification of "school" functioning as an area of impairment establishes a direct, clinically significant link between PMDD and the academic environment.

2.2 Biological and hormonal mechanisms

The exact causes of PMDD and other premenstrual disorders (PMDs) have been a hot topic of research. The influence of luteal phase hormone fluctuations cannot be ignored, these symptoms do not appear before menarche, during pregnancy, or after menopause. Therefore, it is not the hormonal fluctuations themselves that cause PMDD symptoms, but rather the woman's response to those fluctuations. In short, PMDD is an abnormal response of the brain to normal menstrual hormone fluctuations.⁸

Genetic factors may also influence susceptibility, with heritability estimates between 30-80%.⁹ Huo et al. (2007) found a single gene polymorphism in the estrogen receptor alpha (ESR1 gene) and speculated that this may confer differential sensitivity to hormones in women with PMDD.¹⁰ ¹¹ study explored isoprogestosterone (ALLO), the main neuroactive metabolite of progesterone, which is considered a key mechanism in premenstrual anxiety

1 Silber & Valadez-Meltzer, 2005.

2 Bilir et al., 2020.

3 American College of Obstetricians and Gynecologists, 2014.

4 American College of Obstetricians and Gynecologists, 2014.

5 (Epperson et al., 2012).

6 (Pearlstein, 2010)

7 (Epperson et al., 2012)

8 (Cary & Simpson, 2024)

9 (American Psychiatric Association, 2013)

10 (Huo et al., 2007)

11 Emily C.(2023)

disorder (PMDD)¹². Unlike progesterone itself, ALLO, as a neuromodulator, targets GABA-A receptors, which are mainly located in the amygdala and involved in regulating emotional responses. ALLO's regulation of GABA-A receptors usually has an anti-anxiety and mood-improving effect.

However, in PMDD, the effect of ALLO on GABA-A receptors appears to be contradictory, producing negative emotional symptoms rather than positive ones at endogenous luteal levels. This explains the core emotional symptoms of PMDD, thus providing a more precise biological basis for understanding the impact of the disorder on cognitive and emotional states related to academic performance.¹³

2.3 Psychological and emotional impacts

From the literature, terms such as “menstrual moodiness” in the 18th century and “molimina” were used to describe common premenstrual symptoms. In 1931, Frank formally described Premenstrual Tension (PMT), recognizing clusters of severe emotional symptoms¹⁴. The term Premenstrual Syndrome (PMS) was later introduced in 1953 by Greene and Dalton, who argued that premenstrual symptoms extended beyond mere “nervous tension”¹⁵. This evolution reflects a growing recognition that PMS and PMDD involve both emotional and physical dimensions¹⁶. Modern neuropsychology interprets it as a top-down mood regulation disorder. Brain imaging studies of women with premenstrual anxiety disorder provide direct evidence for this model, showing alterations in their neural circuits—for example, patterns consistent with impaired regulation of limbic system activity in the prefrontal cortex¹⁷. This is consistent with established neural models of affective disorders, which suggest that symptoms stem from the prefrontal cortex's inability to control top-down emotional processes.

This established mechanism has unique significance for adolescents. Adolescence is defined as a critical period of cortical development during which significant changes occur in brain neurogenesis, cortical synaptic remodeling, and the neurotransmitter system. Development of the frontal cortex occurs in late adolescence and is closely associated with the maturation of executive functions such as impulse control and goal setting¹⁸. Therefore,

the hormonal fluctuations involved in premenstrual syndrome/premenstrual anxiety disorder are likely to have a disproportionate impact on this regulatory system during the developmental transition. The occurrence of cyclical symptoms may lead to chronic stress during a period of heightened neurological and behavioral vulnerability¹⁹, which may exacerbate mood disorders and increase the risk of mental health disorders.

2.4 Research on PMS vs PMDD

As established in Section 2.1, PMS and PMDD are overlapping but distinct diagnoses that qualify as a premenstrual disorder. Research suggests they are increasingly conceptualized as existing on a continuum of severity, with PMDD representing the most severe, predominantly affective end of the spectrum²⁰.

The prevalence of PMS among female university students varies widely across different populations, ranging from 47.8% to over 90%²¹. Although not as common as PMS, PMDD also affects a significant number of female students. For example, a study in the UAE highlighted a strong link between PMS and reduced academic performance²², while another study in Ethiopia noted a 37% prevalence of PMDD, with measurable academic consequences²³. Furthermore, a study conducted in Northern Ethiopia reported that 83.2% of participants experienced at least one PMS symptom²⁴.

The difference in severity between PMS and PMDD is not only reflected in symptoms but also in functional outcomes. Studies directly comparing the two groups of students have consistently found that students with PMDD have higher rates of absenteeism, more severe academic impairment, and greater disruption to daily life than students with moderate premenstrual syndrome²⁵. These data suggest that although PMDD affects a smaller proportion of the population than PMS, students meeting the diagnostic criteria face a disproportionate number of severe functional impairments.

2.5 Women's educational outcome

In addition, the literature confirms that PMS can impair women's daily life functioning and academic Performance. Studies in this field have employed both objective indicators, such as absenteeism and grade point average,

¹² (Cary & Simpson, 2024)

¹³ (Cary & Simpson, 2024)

¹⁴ (Frank, 1931)

¹⁵ (Greene & Dalton, 1953)

¹⁶ (Cary & Simpson, 2024)

¹⁷ (Petersen et al., 2019)

¹⁸ (Crews et al., 2007)

¹⁹ (Crews et al., 2007)

²⁰ (Cary & Simpson, 2024)

²¹ (Bilir et al., 2020)(Shehadeh & Hamdan-Mansour, 2017)

²² (Omara et al., 2024)

²³ (Minichil et al., 2020)

²⁴ (Houhan et al., 2025)

²⁵ (Minichil et al., 2020),(Omara et al., 2024)

and subjective measures, including self-reported inattention, task inefficiency, and low classroom participation²⁶. Using these indicators, research has shown that female students with PMS experience at least one problem in their work, studies, family, or daily life that leads to decreased productivity or efficiency²⁷.

Literature reviews indicate that PMDD and PMS can negatively affect female students' academic performance (e.g., increased absenteeism), cognitive abilities (e.g., attention), and mental health (e.g., mood instability). Bilir et al.²⁸ found that over 50% of university students reported decreased academic performance during menstruation, with depression identified as the most common symptom affecting their work. Consistent with these findings, Shehadeh & Hamdan-Mansour²⁹ reported that 90% of respondents in their study experienced moderate to severe disruption to learning due to premenstrual symptoms, particularly in areas such as classroom focus and task planning³⁰.

Although the study by Sebert Kuhlmann et al.³¹ focused on access to menstrual health products rather than PMS or PMDD, their findings provide a valuable framework for understanding how unmet menstrual health needs translate into measurable academic disruption and avoidance of seeking help³². Studies have shown a significant correlation between the lack of menstrual hygiene products and student absenteeism or early departure. For example, 12.7% of respondents reported missing classes due to the lack of menstrual hygiene products, and 23.91% reported leaving early due to the lack of menstrual hygiene products³³. In addition, 17.6% of respondents reported that the lack of menstrual hygiene products affected their learning ability, the most common reason being that they were "too worried about menstrual bleeding to concentrate on the lesson"³⁴. Importantly, the study found that students in schools that failed to provide menstrual hygiene products were 2.70 times more likely to have impaired learning ability than students in other schools³⁵.

2.6 Research Gap

While many scholars are currently researching PMS, these

studies still lack sufficient exploration of the educational support and protection policies that women truly desire. Furthermore, these studies lack investigation into the subconscious influence of social environments on women's perceptions of PMS and PMDD, as well as their feelings of shame. PMS and PMDD, and the places behind them of female hormones and physiology, remain an emerging and under-explored field, making comprehensive and in-depth research difficult.

3. Methodology

3.1 Overview and Purpose

This study combining literature review with primary data collection to explore the impact of PMS on female students' academic performance and their support needs.

The process consisted of two phases: first, a literature review was conducted to establish the theoretical foundation and design survey tools. Then, quantitative data were collected through an anonymous online questionnaire, descriptive statistics, correlation, chi-square and charts were used for analysis to quantify the prevalence and impact of the problem.

3.2 Secondary Research

To establish a reliable and solid theoretical foundation, better identify research gaps, and thus find better research entry points and unique insights, a systematic review of existing academic literature was necessary. Search channels included various software and websites such as Google Scholar and online libraries, retrieving professional knowledge literature published over the years on premenstrual syndrome and its impact on female students' academic performance and campus life.

To select the most suitable and credible literature sources, this study use CRAAP (Timeliness, Relevance, Authority, Accuracy, Purposefulness) as a screening framework, with particular attention to accuracy and authority. A sufficiently strong argument requires an authoritative author and excellent, accurate articles to support a sufficiently authoritative foundational theory that remains applicable in the future. Endorsement from professional institutions greatly enhances authority and credibility. At the same time, it is also necessary to pay close attention to the purposefulness of the articles, including only studies with clear academic or clinical research objectives; purely commercial or promotional articles were excluded.

3.3 Questionnaire Design

The questionnaire included questions about age, region,

26 (Shehadeh & Hamdan-Mansour, 2017)

27 (Shehadeh & Hamdan-Mansour, 2017)

28 (2020)

29 (2021)

30 (Bilir et al., 2020),(Shehadeh & Hamdan-Mansour, 2017)

31 (2020)

32 (Oster & Thornton, 2011)

33 (Cotropia, 2019)

34 (Cotropia, 2019)

35 (Cotropia, 2019)

awareness of premenstrual syndrome (PMS), the impact of PMS on individuals, the degree of impact, and specific aspects of these impacts. This study also investigated the assistance and improvement needs of affected students, aiming to understand the core needs of the public and obtain valuable primary information.

3.3.1 Participants

Initially, 138 questionnaires were received. After screening based on completion time and conflicting answers, 8 invalid questionnaires were removed, resulting in 130 valid questionnaires for analysis. Screening criteria included questionnaires completed in less than 23 seconds and questionnaires with significantly inconsistent answers (e.g., question 3 did not show a significant change, but question 4 claimed that the change had a serious impact on life). All participants were female university students. Most students were between 15 and 22 years old, with half (67 participants) being female university students aged 19 to 22.

3.3.2 Materials

This questionnaire consists of four parts (see Appendix): (A) Basic Information, (B) Experience with PMS Symptoms, (C) Specific Impact of Symptoms on Learning Function (if the answer to Part III is “no interference,” then all subsequent answers should be “no symptoms”), and (D) Cognitive and Support Needs. In Part B, questionnaire used multiple-choice and checkbox questions to guide respondents to recall and determine whether PMS interference existed. In Part C, it used a single-choice matrix scale to measure the degree of impact, with options including no impact, slight impact, moderate impact, and severe impact. Part II of the questionnaire used a scale to ask respondents about the extent to which their adverse symptoms or physical changes affected their daily learning and life.

3.3.3 Ethics

This study strictly adhered to standard ethical research guidelines. All participants received a detailed information form before completing the online questionnaire, which clearly explained the research objectives, confirmed the complete anonymity of participants (no personally identifiable information was collected) and voluntary

participation, and stated that the data would only be used for academic purposes related to this Extended Program Qualification (EPQ). The information sheet also emphasizes that participants have the right to withdraw at any time without any adverse consequences. Continuing to answer questions constitutes informed consent. All data was collected and analyzed to ensure that no personally identifiable information could be derived and to protect the information security of respondents.

3.3.4 Procedure

This questionnaire was developed based on a review of existing literature on the relationship between premenstrual syndrome (PMS) and academic performance, as well as observations of common symptoms among peers.

A small-scale pilot test was first conducted to examine the clarity, wording, and relevance of the questionnaire. Based on respondent feedback, the final version of the questionnaire reduced the number of multiple-choice questions, added some common symptoms to Section B, and introduced a matrix scale in Section C to more accurately measure the degree of influence.

The final version of the questionnaire was distributed online via the Wenjuanxing platform and WeChat Moments starting January 10, 2026. Data collection lasted for two weeks, resulting in 130 valid questionnaires.

3.3.5 Data Analysis

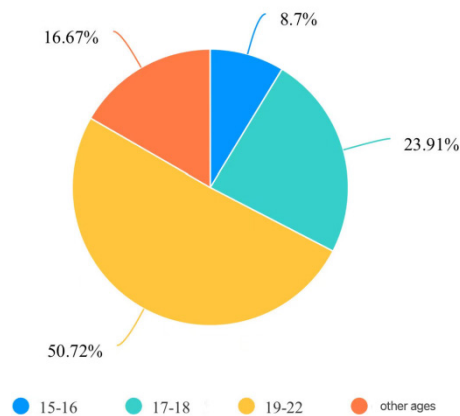
After data collection, to ensure the quality and authenticity of the data used in the analysis. Descriptive statistics (frequency, percentage, mean score) were used to summarize sample characteristics. Pearson correlation analysis was used to examine the relationship between PMS interference (Q4) and overall academic impairment (Q5 total score). Chi-square tests were used to explore the association between symptom occurrence (Q3) and overall academic impairment.

4. Results

A total of 130 valid questionnaires were collected and analyzed using descriptive statistics and cross-tabulation. The results are presented below in tables and figures.

Table 1: Demographic characteristics of respondents (n=130)

Age groups	n	%
15–16	11	8.46%
17–18	30	23.08%
19–22	67	51.54%
Other ages	22	16.92%

**Fig 1: Demographic characteristics of respondents (n=130)****4.1 Basic information of the interviewee**

As shown in Table 1, the majority of respondents (51.54%, n=67) were aged 19–22 years, followed by 17–18 years (23.08%, n=30). and the other category (16.92%, n=22). The smallest proportion of respondents were aged 15–16 years (8.46%, n=11).

4.2 PMS symptom experience and degree of interference

As shown in Table 2, the most frequently reported premenstrual symptom was fatigue or lack of

Table 2: Frequency of self-reported premenstrual symptoms (multiple response set, n=130)

Symptom	n
Fatigue or lack of energy	79
Mood swings (e.g. irritability, anxiety, low mood)	77
Abdominal bloating, headache or body aches	74
Difficulty concentrating	54
Changes in appetite or sleep patterns	35
No significant changes	6

energy, selected by 79 out of 130 respondents. This was followed by mood swings (n=77) and physical symptoms such as bloating, headaches, or body

aches (n=74). These three symptoms were the most common in the sample.

Table 3: Perceived interference of PMS symptoms with daily study and life (n=130)

Level of interference	n	%
No interference	13	10.00
Mild interference	32	24.62
Moderate interference	72	55.38
Severe interference	13	10.00
Mean (SD)	2.65	(0.78)

54 respondents reported difficulty concentrating, and 35 reported changes in appetite or sleep patterns. Only 6 respondents indicated they did not experience significant premenstrual changes. The vast majority of respondents experienced various adverse effects before menstruation. As shown in Table 3, 55.38% (n=72) of respondents reported that their premenstrual symptoms caused mod-

erate interference with their daily study and life. A further 24.62% (n=32) experienced mild interference, while 10.00% (n=13) reported no interference, and another 10.00% (n=13) reported severe interference.

The mean interference score was 2.65 (SD=0.78) on a scale from 1 to 4, indicating an average level between 'mild' and 'moderate' interference.

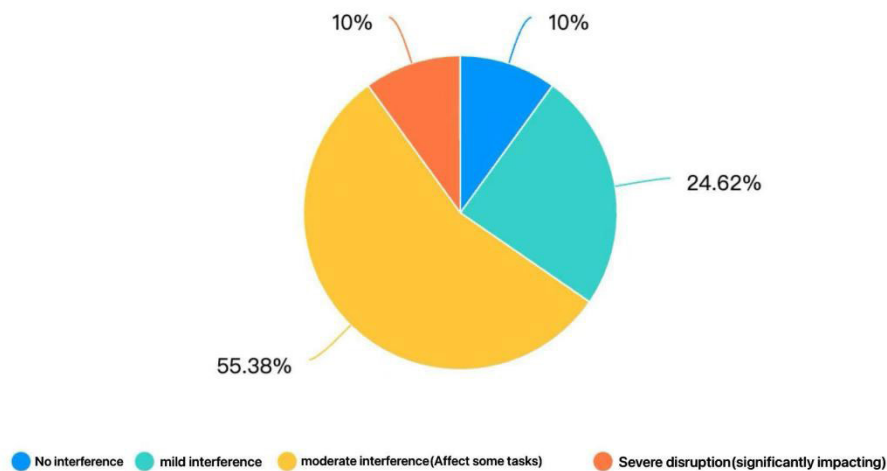


Fig. 2 Distribution of interference levels (pie chart)

4.3 Impact on specific academic abilities

Table 4: Three most affected academic abilities during symptomatic phase (n=130)

Question / Option	No Impact	Minor Impact	Moderate Impact	Significant
Classroom focus	12(9.23%)	41(31.54%)	61(46.92%)	16(12.31%)
Memory (e.g., reciting, recalling knowledge)	15(11.54%)	53(40.77%)	37(28.46%)	25(19.23%)
Clarity of thinking and reaction speed	16(12.31%)	26(20%)	68(52.31%)	20(15.38%)
Task planning and organizational skills	15(11.54%)	44(33.85%)	49(37.69%)	22(16.92%)
Efficiency of completing assignments or studying	14(10.77%)	46(35.38%)	49(37.69%)	21(16.15%)
Willingness to participate in class discussion or group activities	14(10.77%)	40(30.77%)	48(36.92%)	21(16.15%)
Confidence in giving public speeches or presentations	10(7.69%)	48(36.92%)	48(36.92%)	28(21.54%)
Performance on exams or tests	16(12.31%)	44(33.85%)	47(36.55%)	25(19.23%)
Performance on exams or tests	16(12.31%)	44(33.85%)	48(36.92%)	22(16.92%)

Table 4 lists the three academic abilities frequently reported as moderately or severely impaired during the symptom phase. These were selected based on the highest combined percentages of moderate and severe responses in Question 5.

As shown in Table 4, classroom attention was most affected, with 59.23% (n=77) of respondents reporting moderate to severe impairment. This was followed by willingness to participate in classroom discussions or group activities (58.46%, n=76). Confidence in public speaking or presentations was also significantly affected, with 55.38% (n=72) of respondents reporting moderate to severe impairment. One-sample t-tests were conducted to examine whether the mean scores for each academic ability differed significantly

from the scale midpoint of 2.5. The results showed that clarity of thought ($M = 2.71$, $SD = 0.88$, $t(129) = 2.678$, $p = 0.008$), willingness to participate ($M = 2.69$, $SD = 0.93$, $t(129) = 2.356$, $p = 0.020$), and confidence in public speaking ($M = 2.66$, $SD = 0.89$, $t(129) = 2.080$, $p = 0.039$) had mean scores significantly above 2.5, indicating that these abilities were perceived as moderately impaired. Classroom focus approached significance ($M = 2.63$, $SD = 0.83$, $t(129) = 1.802$, $p = 0.074$). The remaining abilities—memory ($M = 2.56$, $SD = 0.93$, $p = 0.453$), organizational ability ($M = 2.61$, $SD = 0.90$, $p = 0.176$), efficiency ($M = 2.58$, $SD = 0.90$, $p = 0.330$), and exam performance ($M = 2.60$, $SD = 0.92$, $p = 0.218$), did not significantly differ from 2.5.

table 5 : One-sample t Test

Item	<i>n</i>	Min.	Max.	Mean	S.D.	<i>t</i>	<i>p</i> Value □
<u>study Memorable</u>	130	1.000	4.000	2.562	0.932	0.753	0.453
<u>study Focus</u>	130	1.000	4.000	2.631	0.827	1.802	0.074*
<u>study Clarity of thought</u>	130	1.000	4.000	2.708	0.884	2.678	0.008***
<u>study Organizational ability</u>	130	1.000	4.000	2.608	0.902	1.361	0.176
<u>study Efficiency</u>	130	1.000	4.000	2.577	0.897	0.978	0.330
<u>study Willingness to participate</u>	130	1.000	4.000	2.692	0.931	2.356	0.020**
<u>study Confident</u>	130	1.000	4.000	2.662	0.885	2.080	0.039**
<u>study Performance</u>	130	1.000	4.000	2.600	0.920	1.239	0.218
* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$							

4.4 Cognition, help-seeking behavior, and support needs

Table 6: Distribution of respondents' awareness levels of PMS and PMDD (n=130)

Level of awareness	<i>n</i>	%
Yes, reasonably familiar	15	11.54
Heard of it but unclear about details	81	62.31
Not familiar at all	34	26.15
Mean (SD)	2.15	(0.60)

As shown in Table 5, only 11.54% (n=15) of respondents reported being reasonably familiar with the medical concepts of PMS or PMDD. The vast majority—62.31% (n=81)—indicated that they had heard of these conditions but were unclear about the specific details, while 26.15% (n=34) stated that they were not familiar with these terms

at all.

The mean score was 2.15 (SD=0.60) on a scale from 1 to 3, where 1 represents 'reasonably familiar' and 3 represents 'not familiar at all'. In this sample, awareness of PMS/PMDD was low, with most respondents clustering in the 'heard but unclear' category.

Table 7: Knowledge of where to seek help (n=130)

Source of help	n	%
Parents or guardians	45	34.62
Subject teacher or personal tutor	35	26.92
Healthcare professional (e.g. GP)	26	20.00
School nurse or counsellor	15	11.54
Do not know where to seek help	9	6.92

Table 6 presents respondents' awareness of available support sources. The most frequently identified source of help was parents or guardians, selected by 34.62% (n=45) of participants. This was followed by teachers or tutors (26.92%, n=35) and healthcare professionals (20.00%, n=26).

Notably, only 11.54% (n=15) of respondents reported that they would seek help from a school nurse or counsellor—the formal health support channel most directly available within educational institutions. Furthermore, 6.92% (n=9) of respondents stated that they did not know where to seek help at all. These findings reveal a significant gap: while the majority of students experience academic interference from PMS symptoms (as shown in Table 3), few are formally diagnosed or seek professional support, and awareness of school-based health services remains extremely low.

4.5 Correlation between PMS interference and academic impairment

This study used Pearson correlation analysis to examine

the relationship between participants' self-reported impact of premenstrual syndrome (PMS) on daily learning and life (Q4) and their overall impairment in learning-related abilities (Q5 total score). The results showed a significant positive correlation between the two variables ($r = 0.551$, $p < 0.01$, $n = 130$).

4.6 Chi-square analysis of changes before menstruation on the degree of interference with the study and li

Figure 3 visualizes the associations shown in Table 7. '0.0' represents respondents who reported no premenstrual symptoms, while '1.0' represents those who reported at least one symptom. The figure shows that among respondents with premenstrual syndrome (PMS) symptoms, the distribution of mild to moderate interference was more concentrated; while among asymptomatic respondents, the proportion reporting no interference was significantly higher. This visualization supports the statistical analysis findings that there is a significant association between the presence of symptoms and academic interference.

fig.3 Changes before menstruation and The degree of interference with study and life Cross-plot

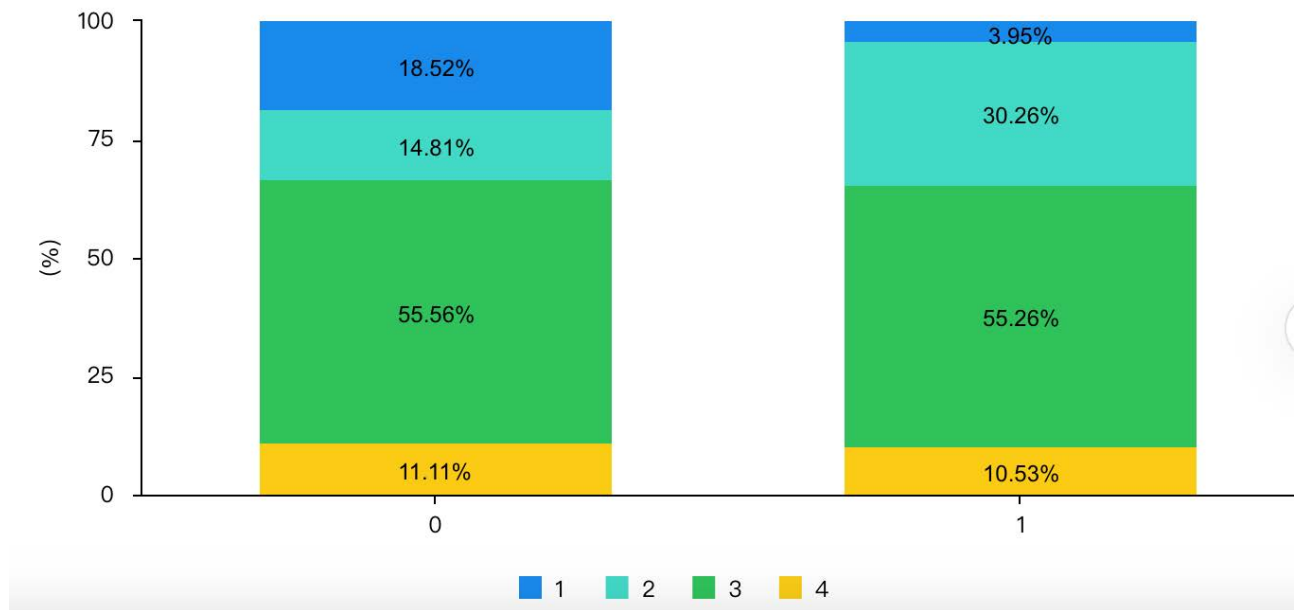


TABLE 8: CHI-SQUARE TEST RESULTS FOR ASSOCIATION BETWEEN PRESENCE OF PMS SYMPTOMS AND LEVEL OF ACADEMIC INTERFERENCE

topic	name	Changes before menstruation(%)		total	χ^2	p
		0.0	1.0			
The degree of interference with study and life	1.0	10(18.52)	3(3.95)	13(10.00)	9.873	0.020*
	2.0	8(14.81)	23(30.26)	31(23.85)		
	3.0	30(55.56)	42(55.26)	72(55.38)		
	4.0	6(11.11)	8(10.53)	14(10.77)		
total		54	76	130		

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

The chi-square test of independence was used to examine the association between premenstrual symptoms (Q3) and the degree of academic interference (Q4). The results showed a statistically significant association between the two variables, $\chi^2(3) = 9.873$, $p = 0.020$, $n = 130$.

As shown in Table 7, among symptomatic respondents,

the highest proportion reported moderate interference (55.26%, $n = 42$), followed by mild interference (30.26%, $n = 23$). In contrast, among asymptomatic respondents, although most also reported moderate interference (55.56%, $n = 30$), the proportion reporting no interference (18.52%, $n = 10$) was significantly higher than in the symptomatic

group (3.95%, $n = 3$). These findings suggest that students experiencing premenstrual symptoms are more likely to report academic impairment, especially when symptoms are mild to moderate.

4.7 Correlation between PMS Interference and Specific Academic Abilities

All correlations were positive and statistically significant at the $p < 0.01$ level, indicating that greater PMS interference is consistently associated with higher levels of im-

pairment across all academic domains. The strongest correlations were observed for exam performance ($r = 0.587$), organizational ability ($r = 0.581$), and classroom focus ($r = 0.551$). The weakest, though still significant, correlation was with confidence in public speaking ($r = 0.377$). These findings suggest that while PMS affects all aspects of academic functioning, its impact is most pronounced on cognitively demanding tasks such as exams and complex planning.

Table 9: Pearson Coefficient (Detailed Format)

		The degree of interference with study and life
study Memorable	Coefficient	0.510***
	p Value	0.000
	n	130
study Focus	Coefficient	0.551***
	p Value	0.000
	n	130
study Clarity of thought	Coefficient	0.541***
	p Value	0.000
	n	130
study Organizational ability	Coefficient	0.581***
	p Value	0.000
	n	130
study_Efficiency	Coefficient	0.451***
	p Value	0.000
	n	130
study Willingness to participate	Coefficient	0.424***
	p Value	0.000
	n	130
study Performance	Coefficient	0.587***
	p Value	0.000
	n	130
study Confident	Coefficient	0.377***
	p Value	0.000
	n	130

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

5. Discussion

5.1 Symptom Prevalence

This study found that almost all respondents experienced premenstrual symptoms, with over 95% reporting at least one of the symptoms. The most common symptoms were fatigue ($n=79$), mood swings ($n=77$), and physical discomfort ($n=74$). 67.88% of respondents reported that these symptoms caused moderate to severe influence on their daily studies and lives, and they average disruption score of 2.65 out of 4. High disruption rate indicates that for most, these symptoms are not merely "annoying," but cause functional disruption, directly impacting their ability to participate in learning. This finding is consistent with previous epidemiological studies that reported an estimat-

ed prevalence of premenstrual syndrome among college students ranging from 47.8% to over 90%³⁶. Evidence from diverse cultural backgrounds, like the UAE³⁷, Ethiopia³⁸, and the UK samples prove in this study.

As discussed in Section 2.2, PMDD is not caused by abnormal hormone levels, but by an abnormal response of the brain to normal hormonal fluctuations³⁹. ALLO, a neuro-active metabolite of progesterone, normally regulates GABA receptors to produce calming effects. However, in women with PMDD, ALLO appears to have a paradoxical effect, triggering negative emotional symptoms rather than

36 (Bilir et al., 2020),(Shehadeh & Hamdan-Mansour, 2017)

37 (Omara et al., 2024)

38 (Minichil et al., 2020)

39 (Cary & Simpson, 2024)

relief⁴⁰. This may explain why some emotional symptoms like anxiety and mood swing are common reported.

5.2 Relationship between symptom interference and learning outcomes

The results showed that there was a moderate positive correlation between the degree of PMS interference (Q4) and the total score of academic impairment (Q5), expressed in the statistics bureau as ($r = 0.551$, $p < 0.01$, $n = 130$). Students who are more severely affected by PMS symptoms are more likely to have more severe impairments in a range of academic abilities, such as attention, memory, task planning, and classroom participation. This is consistent with the literature; the finding is consistent with the results of Bilir et al.⁴¹, who reported that more than 50% of students believed that menstrual symptoms affected their academic performance. The results of Shehadeh and Hamdan-Mansour⁴² also corroborated this view, and they found that 90% of the respondents had moderate to severe learning disabilities⁴³. Earlier studies have shown that PMS affects academic performance, but this study goes a step further by using statistical analysis to show how strong this relationship is, and by highlighting that it affects multiple areas of learning, including concentration, memory, and classroom participation.

5.3 Premenstrual Symptoms and Academic Interference

Results showed a statistically significant association between premenstrual symptoms and academic interference, $\chi^2(3) = 9.873$, $p = 0.020$. Among symptomatic respondents, the highest proportion reported moderate academic interference (55.26%), while among asymptomatic respondents, the proportion reporting no academic interference was higher (18.52% vs 3.95%).

Although the PMS and PMDD have a significant effect on female students' daily life, they have extremely low awareness of these conditions: only 11.54% of respondents indicated they were familiar with these conditions, and 62.31% had heard of them but were unclear about the specifics. Seeking help was equally rare, with only 11.54% of respondents considering school doctors or counselors as potential helpers.

These findings indicate low awareness and limited help-seeking. Because of the stigma surrounding women's menstruation in society, insufficient physiological education leading to menstrual shame, students often ignore the

symptoms of dysmenorrhea and premenstrual syndrome, resulting in worsening symptoms and greater difficulty in seeking medical treatment⁴⁴.

Furthermore, the pervasive stigma and shame associated with menstruation leads the vast majority (73.6%) of students who need menstrual hygiene products to be ashamed to seek help from school staff⁴⁵.

This avoidance of seeking help, coupled with the school's failure to provide menstrual hygiene products, further impacts female students' attendance and academic performance⁴⁶. Academic burden of PMS on students stems not only from the symptoms themselves but also from the systemic silence surrounding menstrual health in the educational environment. This pattern echoes the findings of Shehadeh and Hamdan-Mansour⁴⁷, who found that students with PMS or PMDD rarely consulted healthcare professionals⁴⁸. It also aligns with the findings of Sebert Kuhlmann et al.⁴⁹, who found that 73.6% of students needing menstrual products were ashamed to seek help from school staff⁵⁰. These studies collectively point to a consistent phenomenon: menstrual stigma and institutional concealment exacerbate the physiological burden of premenstrual symptoms, creating a vicious cycle of silently enduring suffering. If future research can find a broader survey sample or use daily diaries, results may be more accurate.

Nevertheless, the findings remain quite clear: the finding data indicate that student awareness is low, and a lot of students do not ask for support. That pattern is strong, and it shows up in multiple ways across the data. This is of vital importance because it indicates that if schools can improve the education of students on physiological hygiene knowledge and create a safer and more supportive environment, then they can truly play a role.

As Sebert Kuhlmann et al.⁵¹ put it, "schools that fail to provide support not only fail to meet the needs of students, but also exacerbate educational inequality"⁵². This is a very powerful point of view, and it encapsulates the significance of the entire project.

40 (Cary & Simpson, 2024)

41 (2020)

42 (2021)

43 (Bilir et al., 2020)

44 (Shehadeh & Hamdan-Mansour, 2021)

45 (Sebert Kuhlmann et al., 2020)

46 (Sebert Kuhlmann et al., 2020)

47 (2021)

48 (Bilir et al., 2020)

49 (2020)

50 (Oster & Thornton, 2011)

51 (2020)

52 (Oster & Thornton, 2011)

6. Evaluation

6.1 Strengths

First, this study used the CRAAP framework to select credible and relevant sources, ensuring a solid theoretical foundation. This ensured a solid theoretical foundation for the study and helped clarify the current state of research on students' insufficient awareness and support for PMS. Second, the questionnaire survey enabled rapid collection of large amounts of data and allowed respondents to remain anonymous, encouraging them to discuss sensitive topics such as menstrual health more openly.

Furthermore, data analysis went beyond simple percentage calculations, employing Pearson correlation analysis and chi-square tests. This study confirmed the association between symptom occurrence and academic disruption. By directly measuring students' cognition and willingness to seek help, directly measuring students' awareness and willingness to seek help, this study addresses a previously underexplored area.

6.2 Limitations

This study used convenience sampling, recruiting participants through online platforms and social networks. Geographical bias may exist in the sample, and inaccurate samples may exist in areas with fewer respondents.

Secondly, questionnaire surveys rely on self-reporting and memory, which may lead to overestimation compared to the most accurate method (i.e., keeping a daily menstrual cycle diary)⁵³. Therefore, different measurement methods may affect the results.

Furthermore, although correlation analysis showed a significant correlation between the two ($r = 0.551$, $p < 0.01$), this does not imply causation. Other unmeasured factors, such as sleep quality or academic stress, may also affect symptom severity and academic performance.

Finally, this study examined students' cognition of premenstrual syndrome and their willingness to seek help, rather than whether they sought help. There is a gap between assumptions and reality. Therefore, it cannot be simply assumed that students will seek help. These data should be interpreted with caution. The findings provide valuable insights into underdeveloped areas and highlight the need for increased school support.

7. Conclusion

This study confirms that premenstrual syndrome (PMS) is prevalent among female students, and its symptoms, such as fatigue, mood swings, and difficulty concentrating, can

severely impact their academic performance.

Despite the significant impact of PMS and its related symptoms, awareness and support for PMS and PMDD remain insufficient, and societal biases hinder students from seeking help. This study found that Chinese female students have insufficient awareness of PMS, and data analysis shows that this lack of awareness significantly affects the degree to which PMS symptoms impact their lives. For example, the questionnaire survey showed that 67.88% of respondents reported that PMS caused moderate to severe academic disruption, while only 11.54% of students truly understood PMS. This study also has some limitations, such as a small sample size, self-reported data which may contain errors, and the fact that the study participants were limited to a specific population. The study indicates that most students believe schools need to provide more support, such as menstrual health lectures, flexible academic support policies (e.g., policies regarding absences and assignment extensions), and health support and counseling services. In conclusion, educational institutions must strengthen menstrual health education, reduce societal stigma, and provide convenient support to improve female students' academic performance and mental and physical well-being. Meanwhile, future research can focus more on the biological mechanisms, prevalence, and effective interventions for PMS and PMDD, thereby better raising societal awareness of PMS and supporting female students' academic and overall health.

In short, addressing premenstrual syndrome (PMS) and premenstrual anxiety disorder (PMDD) in educational institutions will greatly promote gender equality. Female students should receive comprehensive support throughout their education to ensure their academic success and full realization of their potential.

References List

- American College of Obstetricians and Gynecologists. (2014). *Guidelines for women's health care: A resource manual* (4th ed., pp. 607–613).
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>
- Bilir, E., Yıldız, Ş., Yakın, K., & Ata, B. (2020). Dysmenorrhea and premenstrual syndrome: Impact on academic performance of college students. *Turkish Journal of Obstetrics and Gynecology*, 17(3), 196–201. <https://doi.org/10.4274/tjod.galenos.2020.97266>
- Cary, E., & Simpson, P. (2024). Premenstrual disorders and PMDD - a review. *Best practice & research. Clinical endocrinology & metabolism*, 38(1), 101858. <https://doi.org/10.1016/j.beem.2023.101858>
- Cotropia, C. A. (2019). Menstruation management in United

- States schools and implications on attendance, academic performance, and health. *SSRN Electronic Journal*. Advance online publication. <https://doi.org/10.2139/ssrn.3313413>
- Crews, F., He, J., & Hodge, C. (2007). Adolescent cortical development: A critical period of vulnerability for addiction. *Pharmacology Biochemistry and Behavior*, 86(2), 189–199. <https://doi.org/10.1016/j.pbb.2006.12.001>
- Epperson, C. N., Steiner, M., Hartlage, S. A., Eriksson, E., Schmidt, P. J., Jones, I., & Yonkers, K. A. (2012). Premenstrual dysphoric disorder: Evidence for a new category for DSM-5. *American Journal of Psychiatry*, 169(5), 465–475. <https://doi.org/10.1176/appi.ajp.2012.11081302>
- Frank, R. T. (1931). The hormonal causes of premenstrual tension. *Archives of Neurology & Psychiatry*, 26(5), 1053–1057. <https://doi.org/10.1001/archneurpsyc.1931.02230110151009>
- Greene, R., & Dalton, K. (1953). The premenstrual syndrome. *British Medical Journal*, 1(4818), 1007–1014. <https://doi.org/10.1136/bmj.1.4818.1007>
- Houhan, A., Choudhary, R., Choudhary, K., Sharma, S., Gupta, R., & Singh, P. (2025). Prevalence of premenstrual symptoms and their consequences on academic engagement in female students. *Cureus*, 17(5), Article e84367. <https://doi.org/10.7759/cureus.84367>
- Huo, L., Straub, R. E., Roca, C., Schmidt, P. J., Shi, K., Vakkalanka, R., Weinberger, D. R., & Rubinow, D. R. (2007). Risk for premenstrual dysphoric disorder is associated with genetic variation in ESR1, the estrogen receptor alpha gene. *Biological Psychiatry*, 62(8), 925–933. <https://doi.org/10.1016/j.biopsych.2006.12.019>
- Minichil, W., Eskindir, E., Demilew, D., & Mirkena, Y. (2020). Magnitude of premenstrual dysphoric disorder and its correlation with academic performance among female medical and health science students at University of Gondar, Ethiopia, 2019: A cross-sectional study. *BMJ Open*, 10(3), Article e034166. <https://doi.org/10.1136/bmjopen-2019-034166>
- O'Brien, P. M., Bäckström, T., Brown, C., Dennerstein, L., Endicott, J., Epperson, C. N., Eriksson, E., Freeman, E., Halbreich, U., Ismail, K. M., Panay, N., Pearlstein, T., Rapkin, A., Reid, R., Schmidt, P., Steiner, M., Studd, J., & Yonkers, K. (2011). Towards a consensus on diagnostic criteria, measurement, and trial design of the premenstrual disorders: The ISPMMD Montreal consensus. *Archives of Women's Mental Health*, 14(1), 13–21. <https://doi.org/10.1007/s00737-010-0201-3>
- Omara, E. I. M., Salama, R. A. A., Tadross, T. M., Ahmed, S. K., Mohamed, M. G., Dewan, S. M. R., & Islam, M. R. (2024). Impact of premenstrual tension syndrome on academic performance among female university students from the United Arab Emirates: A cross-sectional study. *Health Science Reports*, 7(10), Article e70124. <https://doi.org/10.1002/hsr.2.70124>
- Oster, E., & Thornton, R. (2011). Menstruation, sanitary products, and school attendance: Evidence from a randomized evaluation. *American Economic Journal: Applied Economics*, 3(1), 91–100. <https://doi.org/10.1257/app.3.1.91>
- Pearlstein, T. (2010). Premenstrual dysphoric disorder: Out of the appendix. *Archives of Women's Mental Health*, 13(1), 21–23. <https://doi.org/10.1007/s00737-009-0116-z>
- Petersen, N., Ghahremani, D. G., Rapkin, A. J., Berman, S. M., Liang, L., & London, E. D. (2019). Resting-state functional connectivity in women with PMDD. *Translational Psychiatry*, 9(1), Article 339. <https://doi.org/10.1038/s41398-019-0670-8>
- Shehadeh, J. H., & Hamdan-Mansour, A. M. (2017). Prevalence and association of premenstrual syndrome and premenstrual dysphoric disorder with academic performance among female university students. *Perspectives in Psychiatric Care*, 54(2), 176–184. <https://doi.org/10.1111/ppc.12219>
- Silber, T. J., & Valadez-Meltzer, A. (2005). Premenstrual dysphoric disorder in adolescents: Case reports of treatment with fluoxetine and review of the literature. *Journal of Adolescent Health*, 37(6), 518–525. <https://doi.org/10.1016/j.jadohealth.2005.03.022Appendix>

Appendix

Investigation on Early Symptoms and Learning Experience [Copy]

Part 1: Basic Information (All information is for overall statistical analysis only)

1. What age group are you? [\[Single-choice question\]](#)

Options	Little Calculator	Proportion
15-16 years old	11	 8.46%
17-18 years old	30	 23.08%
19-22 years old	67	 51.54%
Others	22	 16.92%
Fill in the number of valid entries for this question	130	

Choose the city: [\[Fill-in-the-blank question\]](#)

Fill-in-the-blank data can be obtained by downloading Detailed data

Part 2 of 2: Premenstrual Symptom Experience (answer based on the situation in the past 3-6 months)

3. Do you often experience the following emotional or physical changes about 1-2 weeks before your period? (Multiple choice)
[\[Multiple-choice question\]](#)

Options	Xiao Ji	Proportion
Increased mood swings (such as irritability, anxiety, depression)	77	 59.23%
Difficulty concentrating	54	 41.54%
Obvious fatigue or lack of energy	79	 60.77%
Bloating, headache or body aches	74	 56.92%
Changes in appetite or sleep patterns	35	 26.92%
There are few obvious changes	6	 4.62%
Fill in the number of valid entries for this question	130	

4. If you experience the changes mentioned above, how much do they interfere with your daily study and life? [\[Scale questions\]](#)

Average score for this question: 2.65

Options	Little Calculator	Proportion
No interference	13	 10%
Slight interference	32	 24.62%
Moderate interference (has affected some tasks)	72	 55.38%
Severe disruption (significantly affecting efficiency and planning)	13	 10%
Fill in the number of valid entries for this question	130	

Part 3: The specific impact of symptoms on learning function (Skip this part if the answer to Part 3 is "no interference")

5. The extent to which you are affected by the following learning-related abilities during periods when symptoms are more pronounced
[\[matrix single-choice question\]](#)

Question/Option	No effect	Slightly affected	Moderate effects	Very influential
Classroom concentration	12 (9.23%)	41 (31.54%)	61 (46.92%)	16 (12.31%)
Memory (such as reciting, recalling knowledge points)	15 (11.54%)	53 (40.77%)	37 (28.46%)	25 (19.23%)

Mental clarity and reaction speed	16 (12.31%)	26 (20%)	68 (52.31%)	20 (15.38%)
Task planning and organizational skills	15 (11.54%)	44 (33.85%)	49 (37.69%)	22 (16.92%)
Efficiency in completing homework or reviewing	14 (10.77%)	46 (35.38%)	49 (37.69%)	21 (16.15%)
Willingness to participate in class discussions or group activities	14 (10.77%)	40 (30.77%)	48 (36.92%)	28 (21.54%)
Confidence in public speaking or expression	10 (7.69%)	48 (36.92%)	47 (36.15%)	25 (19.23%)
Performance in exams or tests	16 (12.31%)	44 (33.85%)	48 (36.92%)	22 (16.92%)

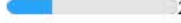
6. How do you usually deal with it if you feel your academic performance is affected? [\[Matrix Single-choice questions\]](#)

Question \ Option	Totally impossible	Most likely not	Uncertain	Very likely	Sure.
Adjust your study plan (such as advancing or postponing tasks)	7 (5.38%)	13 (10%)	21 (16.15%)	71 (54.62%)	18 (13.85%)
Explain the situation to a teacher or family member for forgiveness	11 (8.46%)	23 (17.69%)	34 (26.15%)	44 (33.85%)	18 (13.85%)
Try self-regulation (such as exercise, rest, dietary adjustments)	7 (5.38%)	16 (12.31%)	38 (29.23%)	44 (33.85%)	25 (19.23%)
Feeling troubled but not taking concrete action	9 (6.92%)	21 (16.15%)	34 (26.15%)	52 (40%)	14 (10.77%)

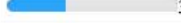
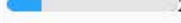
Part 4: Supporting Systems and Cognition

7. Do you know about medical concepts such as premenstrual syndrome (PMS) or premenstrual restlessness disorder (PMDD)? [\[Scale questions\]](#)

Average score for this question: 2.15

Options	Little Calculator	Proportion
Yes, quite familiar	15	 11.54%
I've heard of it but I don't know exactly what it means	81	 62.31%
No idea at all	34	 26.15%
Fill in the number of valid entries for this question	130	

8. Do you know who you can turn to for help or information if the symptoms are causing you persistent trouble with your studies? [\[Single-choice question\]](#)

Options	Little Calculator	Proportion
School doctor or nurse	15	 11.54%
Subject teachers or mentors	35	 26.92%
Parent or guardian	45	 34.62%
Professional medical institutions (such as general practitioners)	26	 20%
Not knowing whom to turn to	9	 6.92%
Fill in the number of valid entries for this question	130	

9. In what aspect do you think schools can provide better support for students? [\[Matrix single-choice question\]](#)

Question/Option	Strongly disagree	Disagree	General	agree	Agree very much
Provide relevant health education	4 (3.08%)	7 (5.38%)	25 (19.23%)	70 (53.85%)	24 (18.46%)
Allow for job extensions when symptoms are severe	2 (1.54%)	8 (6.15%)	37 (28.46%)	47 (36.15%)	36 (27.69%)
Offer quiet rest Spaces or flexible leave systems	2 (1.54%)	5 (3.85%)	24 (18.46%)	60 (46.15%)	39 (30%)

Train teachers to raise relevant awareness	2 (1.54%)	5 (3.85%)	25 (19.23%)	60 (46.15%)	38 (29.23%)
No additional support is required at the moment	18 (13.85%)	13 (10%)	40 (30.77%)	39 (30%)	20 (15.38%)

Questionnaire ends. Thank you again for your participation!

The sum of the average scores of the questions: **4.8**