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Knowledge Matters: The Relationship Between Menstrual Health Literacy and Dysmenorrhea Management in Indonesian Adolescents

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ABSTRACT

Background: dysmenorrhea is one of the most common menstrual problems among adolescents and frequently associated with diminished quality of life, reduced academic performance, and increased school absenteeism. Despite its high prevalence, adolescents often demonstrate insufficient knowledge and rely on suboptimal strategies to manage menstrual pain. Strengthening understanding of the link between knowledge and behaviour is essential for developing effective school based interventions.
Purpose: this study aimed to examine the association between knowledge of dysmenorrhea and pain management behaviour among adolescent girls at SMAN 28 Tangerang, Indonesia.
Methods: a cross sectional analytic design was applied, involving 157 female students who had experienced dysmenorrhea. Data were collected using a structured questionnaire. Data were collected using a structured questionnaire, and the Kolmogorov Smirnov test indicated that the data were not normally distributed. Variables were categorized based on median values, and analysis was conducted using the chi square test.
Results: results showed that 53.5% of respondents had good knowledge, while 63.1% demonstrated good management behaviour. A statistically significant association was identified between knowledge and management behaviour (p=0.013). Adolescents with good knowledge were more than twice as likely to engage in effective dysmenorrhea management practices compared with those with poor knowledge (OR=2.443; 95% CI: 1.258-4.745).
Conclusion: these findings emphasize the importance of targeted educational interventions and supportive school environments to improve menstrual health management among adolescents.

Keywords: Adolescent; Behavior; Dysmenorrhea; Health Knowledge; Pain Management

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BACKGROUND

Adolescence, defined by the World Health Organization (WHO) as the developmental period between 10 and 19 years of age, characterized by profound physical, hormonal, psychological, and social transitions. One of the most significant biological milestones during this stage is puberty, which in girls is marked by the onset of menstruation and signals reproductive maturation (Mardiyah & Rizal, 2024; WHO, 2023). While menstruation is a normal physiological process, it is frequently accompanied by menstrual disorders that can adversely affect adolescents' daily functioning. Among these conditions, dysmenorrhea represents one of the most prevalent and burdensome menstrual health problems affecting adolescent girls and young women worldwide (Anthon et al., 2024).

Dysmenorrhea, defined as cyclic menstrual pain originating from uterine contractions, is a common gynecological condition that often disrupts physical comfort, emotional well-being, and daily activities. Prevalence of primary dysmenorrhea among adolescent and student populations ranges from approximately 60% to 75%, with considerable variation across regions and study methodologies (Mahwish et al., 2024; Wang et al., 2022). Beyond its clinical manifestations, dysmenorrhea has been consistently associated with adverse educational outcomes. Approximately one-fifth of adolescents report school or university absenteeism due to menstrual pain, while a substantially larger proportion experience reduced concentration and impaired academic performance during menstruation (Mahwish et al., 2024). These findings underscore that dysmenorrhea is not only a medical symptom, but a multidimensional issue with implications for adolescents' educational attainment and overall quality of life.

Recent global evidence further confirms the substantial burden of dysmenorrhea among adolescents. A systematic review and meta analysis involving student populations reported a pooled prevalence of primary dysmenorrhea of 66.1%, with higher estimates observed in studies published after 2010 (Wang et al., 2022). Similarly, a meta analysis encompassing 38 studies and more than 21,500 young women under the age of 25 documented a prevalence of 71.1%, with 20.1% of participants reporting absenteeism from school or university and 40.9% experiencing impaired classroom concentration or academic engagement due to menstrual pain (Carlson et al., 2026). Collectively, these findings highlight dysmenorrhea as a persistent public health concern that disproportionately affects adolescents during a critical stage of educational and psychosocial development (Amza et al., 2024; Molla et al., 2022).

Despite its high prevalence and substantial impact, evidence suggests that many adolescents possess limited knowledge regarding dysmenorrhea and rely on suboptimal pain management strategies. Studies conducted in Indonesia and other settings indicate that insufficient knowledge contributes to ineffective coping behaviours, delayed help seeking, and normalization of menstrual pain as an unavoidable experience (Fitriahadi & Nerawati, 2024). Although non pharmacological approaches such as rest, warm

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compresses, and relaxation techniques are commonly practiced, relatively few adolescents seek professional care or apply evidence based interventions. Conversely, intervention studies demonstrate that structured health education can significantly improve knowledge, attitudes, and self-care behaviours related to dysmenorrhea management (Komalasari & Bernica, 2024). This variability in knowledge and behaviour underscores the importance of examining the determinants of dysmenorrhea management, particularly the role of health literacy.

Health literacy is becoming one of the most important predictors for health behavior. Theories of health education have underscored that knowledge is crusial to attitude and behavior change. According to Notoatmodjo's behavioural framework, human health behavior is determined by three principal domains, including knowlegde (cognitive), attitude (affective) and action (psychomotor), that these originate as a product in sequence and in interaction. Knowledge is the base for understanding health knowledge concepts and realizing the significance of healthy behaviors. increasingly recognized as a key driver of adolescent health behaviour. Theoretical models suggest that knowledge influences attitudes, shapes perceived control, and ultimately determines action. Empirical evidence supports this framework, showing that adolescents with higher menstrual health knowledge are more likely to practice appropriate self-care and seek timely medical assistance when needed (Tuladhar et al., 2026). Educational interventions further demonstrate potential long-term benefits, not only in reducing menstrual discomfort but also in minimizing absenteeism and enhancing academic participation. Thus, exploring the relationship between knowledge and behaviour in specific school settings is essential for developing targeted, evidence-based health education programs (Amza et al., 2024).

The Indonesian context illustrates the importance of locally grounded, context sensitive research. National and regional studies consistently report a high prevalence of dysmenorrhea among adolescent and university student populations, often exceeding 60%, alongside persistent gaps in school based reproductive health education and limited access to adolescent friendly health services. Sociocultural norms, variability in curriculum content, and disparities in health service availability across regions further influence adolescents' knowledge and management behaviours. As a result, interventions that are effective in one setting may not be readily transferable to another without contextual adaptation. This heterogeneity highlights the value of school based studies that integrate assessments of knowledge, self reported management behaviour, and contextual factors such as curriculum exposure and access to primary healthcare services (Fitriahadi & Nerawati, 2024).

In Tangerang, preliminary survey conducted at SMAN 28 revealed that approximately 91% of female students reported experiencing menstrual pain, underscoring the urgency of addressing dysmenorrhea within the school setting. of

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female students reported experiencing menstrual pain, underscoring the urgency of addressing dysmenorrhea within the school setting.

OBJECTIVE

This study aims to bridge that gap by analyzing how knowledge influences management behaviour, thereby providing recommendations for targeted educational strategies and policy actions to improve adolescent menstrual health in Indonesia.

METHODS

This study employed an analytic cross sectional design. The study population comprised 765 female students enrolled at SMAN 28 Tangerang, Indonesia. An initial minimum sample size of 263 participants was estimated using the Slovin formula with a 5% margin of error based on the total student population. However, because the study specifically focused on female adolescents who had experienced menstruation and reported dysmenorrhea, only students meeting these eligibility criteria were considered for participation. Based on previous reports indicating that dysmenorrhea affects approximately 60%-70% of Indonesian adolescent girls, an estimated 157 eligible participants were expected from the accessible population. Participants were subsequently recruited using purposive sampling, and a total of 157 respondents who fulfilled all inclusion criteria were included in the final analysis. Eligible participants were female students enrolled in Grades X and XI who had experienced menstruation, reported dysmenorrhea, and provided written informed consent prior to participation.

Data collection was conducted at SMAN 28 Tangerang. Data were collected using a structured self administered questionnaire consisting of two main domains: knowledge of dysmenorrhea and dysmenorrhea management behaviours. Internal consistency reliability was assessed using Cronbach's alpha, yielding coefficients of 0.614 for the knowledge domain and 0.636 for the behaviour domain, both of which exceeded the acceptable threshold of 0.60.

Primary data were collected through an online survey administered via Google Forms. The survey included an information sheet, an informed consent form, and the research questionnaire. Data were processed and analysed using SPSS software. Descriptive statistics were used to summarise participant characteristics and study variables. For bivariate analysis, the chi-square test was applied to examine the association between knowledge of dysmenorrhea and management behaviours (as both variables were categorical), with statistical significance set at $p < 0.05$. Ethical approval for this study was obtained from the Research Ethics Committee of STIK Sint Carolus number 067/KEPPKSTIKSC/VI/2024.

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RESULTS

The study involved 157 female students, all of whom reported having experienced dysmenorrhea. The variables of knowledge and behaviour were initially measured on a numerical scale, which required transformation into categorical data for further analysis. The Kolmogorov Smirnov test was applied to assess the normality of data distribution. The results of this analysis are presented in Table 1.

Table 1. Descriptive Statistics for Knowledge and Behaviour

Variable	Mean	Median	Std. Deviation	Minimum	Maximum	p-value
Knowledge	76	83	17.239	0	100	0.000*
Behavior	57.11	57	22.100	0	100	0.000*

*analysis with Kolmogorov-Smirnov Test

The mean knowledge score among respondents was 76 (SD = 17.239), with a median score of 83 and a wide range from 0 to 100. This distribution indicates substantial variability in adolescents' knowledge of dysmenorrhea, with a tendency toward higher scores as reflected by the median exceeding the mean. The Kolmogorov–Smirnov test yielded a p value of 0.000, indicating that the knowledge scores were not normally distributed.

Similarly, the mean score for dysmenorrhea management behaviour was 57.11 (SD=22.10), with a median of 57 and scores ranging from 0 to 100. The relatively large standard deviation suggests considerable heterogeneity in behavioural practices among respondents. The normality test for behavioural scores also showed a statistically significant result (p=0.000), confirming a non normal distribution.

The non-normal distribution observed in both knowledge and behaviour variables reflects marked disparities among adolescents, where a proportion demonstrate adequate understanding and appropriate management strategies, while others exhibit very limited knowledge and suboptimal practices. Cut off points were defined using the median values. For knowledge, scores ≥83 were classified as good knowledge and while scores <83 were categorized as poor knowledge. For behaviour, scores ≥57 were categorized as good behaviour and scores <57 as poor behaviour.

Table 2. Characteristics Respondents

Characteristics	Frequency	Precentage
Grade classes		
X	69	44
XI	88	56
Knowledge		
Good	84	53.5
Poor	73	46.5
Behavior		
Good	99	63.1
Poor	58	36.9

Among the 157 respondents, 69 students (44.0%) were enrolled in Grade X and 88 students (56.0%) in Grade XI, indicating a slightly higher proportion of participants

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from the second grade of senior high school. In the Indonesian education system, Grade X and XI correspond to the first and second years of Sekolah Menengah Atas (senior high school), generally encompassing students aged 15-17 years.

In terms of knowledge of dysmenorrhea, slightly more than half of the respondents (53.5%, n=84) demonstrated good knowledge, while a substantial proportion (46.5%, n=73) exhibited poor knowledge. This finding suggests that although a majority of adolescents possess an adequate understanding of dysmenorrhea, nearly half remain insufficiently informed, highlighting persistent gaps in menstrual health literacy within the school setting.

Regarding management behaviour, 63.1% (n=99) of participants reported good dysmenorrhea management practices, whereas 36.9% (n=58) demonstrated poor behavioural responses. Notably, the proportion of students with good management behaviour exceeded those with good knowledge, suggesting that some adolescents may adopt coping strategies based on experiential learning, peer influence, or cultural practices rather than formal knowledge alone.

Table 3. Distribution of Respondents' Behaviors in Managing Dysmenorrhea

Behavior in Managing Dysmenorrhea	Yes	No
I immediately seek medical care (such as a midwife practice, doctor's clinic, health center, or hospital) when experiencing severe abdominal pain during menstruation	65 (41%)	92 (59%)
I practice relaxation techniques, such as deep breathing, during menstruation to help reduce pain	121 (77%)	36 (23%)
I apply a warm compress to the lower abdomen when menstrual pain occurs to relieve discomfort	109 (69%)	48 (31%)
I exercise regularly to prevent menstrual pain	60 (38%)	97 (62%)
I listen to music to distract myself from menstrual pain	92 (59%)	65 (41%)
I watch movies to distract myself from menstrual pain	85 (54%)	72 (46%)
I rub my abdomen with warm oil when menstrual pain occurs to help reduce discomfort	96 (61%)	61 (39%)

The distribution of dysmenorrhea management behaviours among respondents reveals a heterogeneous pattern of coping strategies, reflecting varying levels of health literacy, accessibility to healthcare services, and reliance on non pharmacological self care practices.

Less than half of the respondents (41%) reported seeking professional medical care, such as midwifery services, clinics, or health centres, when experiencing severe menstrual pain, while a majority (59%) did not. This finding suggests a substantial reliance on self management and potentially indicates barriers to formal healthcare utilization, including perceptions that dysmenorrhea is a "normal" condition that does not warrant medical attention, limited access to adolescent friendly services, or sociocultural norms discouraging help seeking behaviour.

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A large proportion of respondents reported practicing relaxation techniques such as deep breathing (77%) and applying warm compresses to the lower abdomen (69%). These behaviours are consistent with evidence based recommendations for first line dysmenorrhea management and suggest that adolescents are inclined toward strategies that are perceived as safe, accessible, and culturally acceptable.

More than half of the respondents reported listening to music (59%) or watching movies (54%) to cope with menstrual pain. While these approaches do not directly address the physiological mechanisms of dysmenorrhea, they may contribute to perceived pain relief through psychological modulation and improved emotional coping.

Conversely, preventive behaviours such as regular exercise were among the least frequently practiced, with only 38% of respondents reporting engagement in physical activity to prevent menstrual pain. This low uptake may reflect limited awareness of the long term benefits of exercise for menstrual health, time constraints related to academic demands, or misconceptions that physical activity may exacerbate pain.

The practice of rubbing the abdomen with warm oil (61%) further illustrates the integration of culturally rooted practices into dysmenorrhea management. While empirical evidence for this specific practice is limited, its widespread use suggests that culturally familiar methods may enhance adherence and comfort.

Overall, these findings indicate that adolescents predominantly rely on self directed, non clinical, and symptom focused strategies to manage dysmenorrhea, with comparatively low utilization of professional healthcare services and preventive behaviours.

Table 4. Association between Knowledge and Management Behaviour of Dysmenorrhea

Knowledge	Management behavior			P value	OR 95% CI
	Good n (%)	Poor n (%)	Total n (%)		
Good	61 (38.9)	23 (14.6)	84 (53.5)	0.013*	2.443 1.258-4.745
Poor	38 (24.2)	35 (22.3)	73 (46.5)		
Total	99 (63.1)	58 (36.9)	157 (100)		

*analysis with Chi Square test

The bivariate analysis demonstrated a statistically significant association between knowledge of dysmenorrhea and management behaviour among adolescent girls (p=0.013). As presented in table 4, respondents with good knowledge were substantially more likely to exhibit good dysmenorrhea management behaviour compared with those with poor knowledge.

Among adolescents with good knowledge, 61 participants (38.9%) reported appropriate management behaviours, whereas only 23 participants (14.6%) demonstrated poor management practices. In contrast, among respondents with poor knowledge, the distribution of management behaviour was more evenly divided, with 38 participants (24.2%) reporting good behaviour and 35 participants (22.3%) reporting

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poor behaviour. This pattern indicates that limited knowledge is associated with greater variability and inconsistency in dysmenorrhea management practices.

The calculated odds ratio (OR=2.443; 95% CI: 1.258-4.745) indicates that adolescents with good knowledge were more than twice as likely to engage in effective dysmenorrhea management behaviours compared to their peers with poor knowledge. The confidence interval does not include unity, further confirming the robustness and statistical significance of this association.

DISCUSSION

The present study examined the relationship between knowledge of dysmenorrhea and management behaviour among adolescent girls at SMAN 28 Tangerang, Indonesia. Results demonstrated that more than half of the respondents (53.5%) possessed a good level of knowledge regarding dysmenorrhea, while 46.5% were classified as having poor knowledge. This distribution suggests that although many adolescents have been exposed to basic menstrual health information, considerable knowledge gaps persist. These gaps are particularly concerning given the high global prevalence of dysmenorrhea and its documented consequences for adolescent well-being, quality of life, and academic performance (Amza et al., 2024; Mahwish et al., 2024; Wang et al., 2022).

The proportion of students with good knowledge in this study is broadly consistent with previous research conducted in Indonesia. Nur and Samaria (2021), in their study among adolescents at Ghama D'Leader School, reported that 55.7% of respondents demonstrated good knowledge regarding menstrual pain management (Nur & Samaria, 2021). Similar patterns have been observed in other low- and middle-income settings. For example, a study in Tanzania found that adolescents commonly used resting, warm beverages, light physical activity, and analgesics to manage menstrual pain; however, many participants held misconceptions regarding pharmacological treatments, believing that medications were harmful or could negatively affect fertility .(Cherenack et al., 2023)

Knowledge in the health sciences is not merely factual recall, it encompasses the capacity to apply, analyze, and evaluate information. According to Notoatmodjo, knowledge exists on a continuum from simple awareness ("knowing that") to complex synthesis and evaluation ("knowing why and how"). Low knowledge corresponds to basic awareness without deeper comprehension, medium knowledge reflects the ability to apply and analyze, while high knowledge allows synthesis and evaluative judgment. In the context of dysmenorrhea, this framework is important: adolescents who only know that dysmenorrhea is painful may not seek proper care, whereas those with deeper understanding may identify effective management strategies and discern when professional care is needed (Susilawati et al., 2022).

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The present study also revealed a critical knowledge gap regarding etiology. While the majority of respondents could define menstruation, describe symptoms, and mention management techniques, 76% answered incorrectly when asked about one of the causes of dysmenorrhea. A total of 120 students failed this item, underscoring that biological and pathophysiological understanding is limited. This pattern mirrors other findings in Indonesia. Studying Grade IX students in Denpasar, reported that while many adolescents could correctly define dysmenorrhea (87%) and identify its consequences (86.3%), fewer could accurately recognize its symptoms (64.9%) or causes. This suggests that surface level information definitions and consequences may be more readily transmitted in schools or informal discussions, while deeper etiological understanding is often neglected (Fredelika et al., 2021).

The gap in etiological knowledge has practical implications. Dysmenorrhea is largely attributed to increased prostaglandin production in the endometrium, which causes uterine contractions and pain (Aziza et al., 2024). Adolescents unaware of such mechanisms may not appreciate the rationale behind pharmacological management, such as NSAID use, which directly inhibits prostaglandin synthesis. Similarly, they may underestimate the role of preventive strategies like exercise, nutrition, and stress management, all of which modulate hormonal balance. Without such understanding, behaviours may be inconsistent or ineffective, as students may resort to rest alone or tolerate pain passively, waiting for symptoms to resolve spontaneously.

Importantly, the present study's findings show that despite general awareness, misconceptions persist. Adolescents in Indonesia, as in many cultural contexts, often receive fragmented reproductive health education. In many schools, menstrual health content is subsumed under broader biology curricula, focusing on anatomy and physiology without integrating clinical conditions or their management (Natalia et al., 2022). As a result, students may know "what menstruation is" but not "what to do when it causes problems". The knowledge gaps identified in SMAN 28 Tangerang thus reflect systemic shortcomings in the educational curriculum as well as broader sociocultural barriers that limit open conversations about menstrual pain.

Furthermore, knowledge acquisition among adolescents is influenced by multiple determinants, including age, educational stage, socioeconomic background, cultural norms, and exposure to information through media or peers. The age range of students in Grades X and XI (15-17 years) corresponds to mid-adolescence, which according to WHO is a critical developmental period marked by growing cognitive capacity and increasing independence. At this stage, adolescents are capable of abstract reasoning and can grasp causal relationships, making them receptive to complex information about reproductive health. However, their sources of information may not always be reliable. Social media, peer groups, and family traditions play a strong role, sometimes perpetuating myths or misinformation about menstruation (WHO, 2023).

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In addition, the Indonesian cultural context shapes how knowledge is both accessed and internalized. Menstruation is still stigmatized in many communities, and discussions are often limited to close family members or not addressed at all (Ayunda et al., 2024). Such taboos may lead to incomplete or distorted knowledge, where adolescents learn through fragmented experience rather than systematic instruction. This cultural silence can explain why many respondents understood the broad concept of dysmenorrhea but failed to identify its biological causes.

The role of age and experience in shaping knowledge is also noteworthy. Safira et al., (2024) emphasized that as adolescents grow older, their experiences and exposure to information increase, leading to greater knowledge maturity. In SMAN 28, students aged 16–18 may have already experienced several years of menstruation, which itself serves as a form of experiential learning. Yet, experience without structured guidance does not necessarily translate into correct understanding. Pain may be normalized as a "part of being female," reducing the urgency to seek explanations. This normalization effect has been documented in multiple global studies, where many young women considered menstrual pain inevitable and therefore did not prioritize learning about underlying causes or management strategies (Mahwish et al., 2024).

The large proportion with poor knowledge and the specific gap in etiological understanding underscore systemic limitations in school curricula and cultural communication about menstrual health. These findings call for strengthened educational interventions that move beyond biological definitions to include causes, prevention, and evidence-based management of dysmenorrhea.

The second major finding of this study concerns behavioural responses to dysmenorrhea among female adolescents at SMAN 28 Tangerang. Results demonstrated that 99 respondents (63.1%) engaged in "good behaviour" in managing menstrual pain, while 58 respondents (36.9%) fell into the "poor behaviour" category. This distribution reveals that although a majority of students apply some form of appropriate coping strategies, a substantial minority still rely on inadequate or ineffective practices. These results are broadly consistent with findings in other Indonesian and global contexts, where knowledge does not always translate directly into effective behaviour, and where cultural, structural, and psychosocial barriers often determine whether appropriate management strategies are adopted.

The proportion of students reporting good behaviour (63.1%) is notable, as it indicates that the majority of respondents in SMAN 28 were able to adopt at least some evidence-based coping strategies. This is consistent with Safira et al., (2024), who in a study of students at SMK Kesehatan Wonosari found that 90.5% of respondents reported positive management behaviour toward dysmenorrhea. While the proportion of good behaviour was lower in the present study compared to Husna's, the general direction aligns with national evidence showing that adolescents are increasingly aware of the importance of menstrual pain management. It also suggests that exposure to

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health information whether through formal education, peer groups, or digital platforms is contributing to better coping practices among high school students (Safira et al., 2024).

The relatively high proportion of good behaviour in SMAN 28 thus reflects not only knowledge but also the accessibility and cultural acceptability of non-pharmacological methods.

However, preventive strategies such as exercise were underutilized. Ninety-seven respondents (62%) reported not engaging in preventive actions to reduce the likelihood or severity of menstrual pain. This finding is consistent with prior research in Indonesia, (Fredelika et al., 2021). where many students reported neglecting preventive measures (Fredelika et al., 2021). Globally, evidence suggests that regular physical activity can significantly reduce the intensity of dysmenorrhea, yet this behaviour is rarely practiced among adolescents, possibly due to lack of awareness, cultural norms discouraging exercise during menstruation, or absence of supportive school environments (Mahwish et al., 2024). In many cases, adolescents normalize menstrual pain and perceive it as an unavoidable aspect of womanhood, thus avoiding medical services. Others may face barriers such as embarrassment, lack of privacy, limited adolescent friendly services, or economic constraints. This pattern is particularly concerning because untreated dysmenorrhea can lead to absenteeism, decreased academic performance, and reduced quality of life.

The behavioural patterns observed in SMAN 28 mirror findings from other Indonesian studies. For instance, in Denpasar, Fredelika (2021) found that 72% of students had never used school health services (UKS) for menstrual pain, and many preferred to wait until the pain resolved spontaneously (88.9%). Only a minority engaged in proactive prevention, such as consuming nutritional supplements or maintaining regular exercise. Similarly Andriani et al., (2025) in Takalar reported that adolescents often relied on traditional remedies or passive tolerance rather than structured intervention. These findings demonstrate a broader trend in Indonesia, while adolescents may adopt some coping strategies, active and preventive measures remain underutilized, and engagement with formal healthcare systems is minimal.

The observed behavioural patterns must be understood in the context of multiple determinants. Behavioural science highlights that knowledge is necessary but not sufficient for behaviour change. Other critical factors include attitudes, perceived barriers and benefits, social norms, and self efficacy (Albarracín et al., 2025). For instance, even adolescents with good knowledge may refrain from seeking medical care due to embarrassment or lack of adolescent friendly health facilities. Similarly, those with poor knowledge may still adopt good behaviours through peer influence or family advice.

Moreover, school environments influence behaviour. In many schools, health education is limited to biology curricula that emphasize anatomy and physiology rather

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than practical management strategies. School health units (UKS) are often underutilized or under-resourced, as shown in (Fredelika et al., 2021). Thus, even when adolescents wish to seek help, institutional barriers may limit their options (Fredelika et al., 2021). The behavioural findings from SMAN 28 highlight both progress and challenges. The fact that nearly two-thirds of students engage in good behaviour indicates that adolescents are not entirely passive in dealing with dysmenorrhea. They are adopting strategies, often non pharmacological, that provide some relief. However, the persistence of poor behaviours among more than one-third of respondents indicates that knowledge gaps, cultural stigma, and structural barriers continue to constrain effective management.

These results reinforce the need for integrated interventions that combine education with enabling environments. Adolescents must be empowered not only with knowledge but also with supportive social norms, accessible health services, and opportunities to practice preventive strategies. Without addressing these broader determinants, knowledge alone will not guarantee behavioural change.

One of the most critical findings of this study was the statistically significant association between knowledge and dysmenorrhea management behaviour among adolescents at SMAN 28 Tangerang. The chi-square test yielded a p-value of 0.013, indicating that the relationship was unlikely to be due to chance. Furthermore, the odds ratio of 2.443 (95% CI: 1.258-4.745) demonstrated that students with good knowledge were more than twice as likely to practice good management behaviour compared to those with poor knowledge. This result strengthens the argument that knowledge functions as a key determinant of health-related behaviour in the context of menstrual pain management.

The odds ratio provides a measure of effect size, quantifying the strength of association between knowledge and behaviour. An OR greater than 2.0 is typically considered meaningful in public health research, especially when accompanied by a confidence interval that does not include 1.0, as was the case in this study. This suggests that knowledge is not merely correlated with behaviour but is indeed a factor that influences the likelihood of adopting effective management practices. From a practical standpoint, this finding implies that interventions aimed at improving knowledge may yield measurable improvements in behaviour, reducing the negative impact of dysmenorrhea on adolescents' quality of life and educational outcomes.

However, statistical significance does not always translate into universal behavioural change. While students with good knowledge were more likely to practice good behaviour, not all did so. Conversely, some students with poor knowledge still demonstrated good management behaviour. This complexity underscores the importance of critically analyzing not just the association itself, but also the exceptions within each category.

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Among the 84 respondents classified as having good knowledge, 61 (38.9%) exhibited good behaviour, but 23 (14.6%) still fell into the poor behaviour category. This discordance raises important questions. Why do some adolescents with adequate knowledge fail to translate that knowledge into effective action? Several explanations are possible. First, knowledge alone may not be sufficient without motivation and self-efficacy. According to the Health Belief Model, individuals act when they perceive susceptibility, severity, benefits, and low barriers to action. Students may understand dysmenorrhea and its management in theory but may not feel empowered or motivated to act, especially if social norms stigmatize seeking medical care or discourage preventive practices.

Second, structural barriers may hinder the translation of knowledge into behaviour. Student may know the importance of exercise but may face cultural expectations to rest during menstruation. Third, psychosocial factors such as stigma, embarrassment, or peer influence may override knowledge. Adolescents may hesitate to discuss menstrual pain openly or to seek help from teachers, peers, or health professionals, even if they know it is the right course of action. This reflects the broader cultural context in Indonesia and many other societies where menstruation remains a taboo subject.

Interestingly, the data also revealed that 38 respondents (24.2%) with poor knowledge still exhibited good behaviour. This paradox suggests that behavioural learning may occur through informal channels, independent of structured knowledge. For example, adolescents may adopt effective coping strategies through trial and error, peer influence, or family guidance, even without fully understanding the underlying causes of dysmenorrhea.

This phenomenon is consistent with Bandura's Social Cognitive Theory, which emphasizes observational learning and modeling. Adolescents may observe peers or family members using heat therapy, relaxation techniques, or medications and replicate these behaviours, regardless of whether they possess the theoretical knowledge to justify them. Such findings caution against overly deterministic interpretations of the knowledge-behaviour link and highlight the multifactorial nature of health behaviours.

The observed association between knowledge and behaviour aligns with established health behaviour theories but also reveals their limitations. The Health Belief Model and Theory of Planned Behaviour both emphasize the role of knowledge and beliefs in shaping behaviour. The present findings confirm that knowledge increases the likelihood of good behaviour but also demonstrate that other constructs attitudes, norms, perceived control play significant roles.

The presence of good behaviour among students with poor knowledge underscores the relevance of Social Cognitive Theory, which highlights the influence of social and environmental factors. Adolescents are embedded in networks of peers, teachers, and families, and these networks can facilitate behavioural adoption even in

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the absence of formal knowledge. Therefore, interventions must address not only knowledge deficits but also the social contexts in which adolescents live and learn.

The strength of association observed in SMAN 28 Tangerang is consistent with findings from other Indonesian studies. Andriani et al., (2025) reported a statistically significant association ($p < 0.001$) between knowledge and behaviour among adolescents in Takalar, while Mardiyah & Rizal (2024) found a similar relationship among students in Denpasar. These consistent results across diverse Indonesian settings reinforce the robustness of the knowledge behaviour link.

Limitations of this study critically reflect on the methodological aspects of the association analysis. Categorizing continuous knowledge and behaviour scores into binary categories (good vs poor) simplifies analysis but may obscure nuances. Students with scores just below or above the median may have been classified differently despite having similar levels of knowledge or behaviour. Data were collected using a self-administered online questionnaire distributed through Google Forms, which may have introduced information bias. Participants may have misunderstood certain questions, provided socially desirable responses, or completed the questionnaire without direct supervision, potentially affecting the accuracy of the self-reported data. Additionally, the cross sectional design precludes causal inference, while knowledge is associated with behaviour, the directionality cannot be firmly established. It is possible that adolescents who adopt good behaviours may subsequently acquire more knowledge through experiential learning, rather than knowledge always preceding behaviour.

Despite these limitations, the findings provide valuable evidence that menstrual health literacy is associated with dysmenorrhea management among Indonesian adolescents. The results highlight the importance of incorporating menstrual health education into school-based reproductive health programs to improve adolescents' capacity for appropriate self-management of dysmenorrhea. Future studies should employ longitudinal or interventional designs to clarify the temporal relationship between menstrual health literacy and management behaviors. In addition, the use of validated instruments and mixed-methods approaches may provide a more comprehensive understanding of the factors influencing dysmenorrhea management among adolescents.

CONCLUSION

This study demonstrated that dysmenorrhea is a common experience among female adolescents at SMAN 28 Tangerang, with all respondents reporting menstrual pain. More than half of the participants (53.5%) exhibited good knowledge regarding dysmenorrhea, while 63.1% demonstrated good management behaviour. Statistical analysis confirmed a significant association between knowledge and behaviour ($p=0.013$; OR=2.443, 95% CI=1.258-4.745), indicating that adolescents with higher levels of knowledge were more than twice as likely to practice effective management

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strategies.

In conclusion, this study highlights both progress and gaps in adolescent menstrual health knowledge and dysmenorrhea management behaviour in Indonesia. While knowledge significantly increases the likelihood of positive management behaviour, persistent misconceptions and barriers limit optimal outcomes

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