ORIGINAL ARTICLE ÖZGÜN ARAŞTIRMA

Menstrual Knowledge Among Adolescents and Young Adults Across Developmental Stages

Ergenler ve Genç Yetişkinlerde Gelişimsel Dönemlere Göre Menstrüel Bilgi Düzeyi

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Cite this article as: Kalkan EŞ, Bilgin ZE, Kharbatia SN, Pehlivantürk Kızılkan M, Akgül S. Menstrual knowledge among adolescents and young adults across developmental stages. J Curr Pediatr. 2026;24(2):111-8

Abstract

Introduction: As the menstrual cycle is considered a vital sign of adolescent health, understanding normal menstrual characteristics is crucial. This study aimed to evaluate menstrual knowledge among adolescent and young adult females across different developmental stages and to examine the association between receiving menstrual information and menstrual knowledge.

Materials and Methods: A total of 257 adolescent and young adult females aged 10-24 years were included in the study and completed an online, self-administered questionnaire. Participants were categorized into early (10-14 years), middle (15-18 years), and late adolescence/young adulthood (19-24 years). Sociodemographic characteristics, menstrual information sources, and menstrual knowledge were assessed using multiple-choice questions. Each correct response to menstrual knowledge questions in accordance with the American College of Obstetricians and Gynecologists 2015 Committee opinion, was scored as 1 point (total score: 0-4), with higher scores indicating greater menstrual knowledge. Participants who correctly answered all items were classified as having complete menstrual knowledge.

Results: Overall, 91.4% of participants reported receiving menstrual information, most commonly from parents (70.8%), followed by the internet/media (58.8%) and school/teachers (58.4%). Complete menstrual knowledge rates (64.3% vs 31.8%, p=0.003) and menstrual knowledge scores (3.66±0.59 vs. 3.00±1.12, p=0.002) were significantly higher among those who had received menstrual information compared with those who had not. Both complete menstrual knowledge rates and knowledge scores increased across developmental stages (p=0.029 and p=0.003, respectively), with the highest levels observed in late adolescence/young adulthood.

Conclusion: Although most adolescents and young adults reported having received menstrual information, correct menstrual knowledge remained suboptimal, particularly during early and middle adolescence. These findings underscore the importance of structured, developmentally adapted menstrual health education programs that extend beyond simple information dissemination. Integrating age-appropriate menstrual education into school curricula and routine adolescent healthcare may facilitate earlier recognition of abnormal menstrual patterns and support informed health-seeking behaviors.

Keywords
Menstrual knowledge, adolescents, young adults, menstrual health education, developmental stages

Anahtar kelimeler
Menstrüel bilgi; ergen, genç yetişkin, menstrüel sağlık eğitimi, gelişimsel evreler

Received/Geliş Tarihi : 06.05.2026
Accepted/Kabul Tarihi : 12.06.2026
Published Date/ Yayınlanma Tarihi : 04.08.2026

DOI:10.4274/jcp.2026.34032

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Öz

Giriş: Menstrüel döngü, ergen sağlığında hayati bir belirteç olarak kabul edilmektedir ve normal menstrüel özelliklerin bilinmesi büyük önem taşımaktadır. Bu çalışmada, ergen ve genç yetişkin kadınlarda farklı ergenlik evrelerinde menstrüel bilgi düzeyinin değerlendirilmesi ve menstrüasyon hakkında bilgi alma durumu ile menstrüel bilgi arasındaki ilişkinin incelenmesi amaçlanmıştır.
Gereç ve Yöntem: Çalışmaya, çevrimiçi olarak uygulanan öz-bildirim temelli anketi tamamlayan 10-24 yaş aralığındaki toplam 257 ergen ve genç yetişkin kadın dahil edildi. Katılımcılar erken (10-14 yaş), orta (15-18 yaş) ve geç ergenlik/genç yetişkinlik (19-24 yaş) olmak üzere üç gruba ayrıldı. Sosyodemografik özellikler, menstrüasyon hakkında bilgi kaynakları ve menstrüel bilgi düzeyi çoktan seçmeli sorular kullanılarak değerlendirildi. Menstrüel bilgiyle ilgili sorulara verilen her doğru yanıt 1 puan kabul edildi (toplam puan: 0-4), daha yüksek puanlar daha fazla menstrüel bilgi olarak değerlendirildi. Tüm soruları doğru yanıtlayan katılımcılar American College of Obstetricians and Gynecologists 2015 Komite görüşüne göre tam doğru menstrüel bilgiye sahip olarak sınıflandırıldı.
Bulgular: Katılımcıların %91,4'ü menstrüasyon hakkında bilgi aldığını bildirdi. En sık bildirilen bilgi kaynağı ebeveynler (%70,8) olup bunu internet/medya (%58,8) ve okul/öğretmenler (%58,4) izledi. Tam doğru menstrüel bilgi oranları (%64,3 ve %31,8; p=0,003) ve menstrüel bilgi puanları (3,66±0,59 ve 3,00±1,12; p=0,002) bilgi aldığını bildirenlerde almayanlara göre anlamlı derecede daha yüksek bulundu. Hem tam doğru bilgi oranları hem de menstrüel bilgi puanları ergenlik evreleri arasında yaşla birlikte artış göstererek en yüksek bilgi düzeyleri geç ergenlik/genç yetişkinlik grubunda gözlemlendi (sırasıyla p=0,029 ve p=0,003).
Sonuç: Katılımcıların çoğu menstrüasyon hakkında bilgi aldığını bildirmiş olsa da doğru menstrüel bilgi özellikle erken ve orta ergenlik dönemlerinde yetersiz kalmıştır. Bulgularımız, basit bilgi aktarımının ötesine geçen, gelişimsel olarak uyarlanmış ve yapılandırılmış menstrüel sağlık eğitimi programlarının gerekliliğini ortaya koymaktadır. Yaşa uygun menstrüel sağlık eğitiminin okul müfredatına ve rutin ergen sağlık hizmetlerine entegre edilmesi, anormal menstrüel paternlerin erken tanınmasına ve bilinçli sağlık başvurularının desteklenmesine katkı sağlayabilir.

Introduction

The menstrual cycle is a normal physiological process in females and is considered a vital sign of overall health during adolescence and young adulthood. Menarche typically occurs between 12 and 13 years, within 2-3 years after thelarche (1). Menstrual cycles generally range from 21 to 45 days, with an average bleeding duration of 2-7 days (1). In adolescents, deviations from this normal pattern in terms of frequency, duration, volume or regularity are considered as abnormal uterine bleeding and may range from amenorrhea to heavy menstrual bleeding. Menstrual periods that do not begin within 3 years of thelarche or by 15 years of age, occur more frequently than every 21 days or less frequently than every 45 days, last longer than 7 days, occur 90 days apart even after a one spontaneous cycle, bleeding that soaks through one pad or tampon within two hours or less, or bleeding between periods should be considered abnormal (1,2). Although anovulatory cycles are common during adolescence, due to immaturity of the hypothalamic-pituitary-ovarian axis, these deviations can also be indicators of underlying health problems and may negatively impact quality of life, academic performance, and social participation in adolescents.

Despite being a normal physiological process, menstruation remains surrounded by misconceptions, taboos, and varying levels of knowledge among adolescents. Data from low- and middle-income countries indicate that many adolescent girls enter menarche with limited information, demonstrating insufficient understanding of menstrual hygiene, cycle regularity, and underlying physiological processes, and often experiencing anxiety or fear due to inadequate preparation (3). In a large study of Turkish schoolgirls aged 10-17 years, approximately half of the participants were unaware of the interval between pubertal onset and menarche, and most reported their mothers as their primary source of information, underscoring the need for structured education on puberty and menstruation (4). Furthermore, beyond gaps in knowledge, many menstrual challenges and symptoms are perceived as normal by young people, which may delay recognition and appropriate management of menstrual health concerns (5).

Although several studies have explored menstrual knowledge and related practices among adolescents, important gaps remain in the existing literature. Most research has focused on narrow age ranges or school-based populations, limiting understanding of how menstrual knowledge differs across developmental stages. Moreover, few studies have examined menstrual knowledge across early, middle, and late adolescence while also incorporating young adulthood as a distinct developmental stage. As a result, age-related differences in menstrual knowledge and the potential influence of prior menstrual information across this broader age spectrum remain insufficiently characterized.

To address these gaps in the literature, this study aimed to evaluate menstrual knowledge among adolescent and young adult females by examining different developmental stages separately and to investigate the association between prior

exposure to menstrual information and correct menstrual knowledge. Covering a wide age range and focusing on self-reported menstrual knowledge components, this study aims to raise awareness of differences in understanding normal menstrual characteristics among adolescents and young adults and to identify priority areas for targeted health education interventions.

Materials and Methods

Study Design and Participants

This cross-sectional study was conducted among adolescent and young adult females aged 10-24 years. All participants who provided informed consent, and additionally parental consent for those under 18 years of age, were invited to complete an online questionnaire. Participants were categorized into early (10-14 years), middle (15-18 years), and late adolescence/young adulthood (19-24 years) based on chronological age.

Eligibility was assessed through screening questions prior to answering the questionnaire, and adolescents and young adults who had not yet experienced menarche, had known endocrine disorders affecting menstruation, or were under clinical follow-up for menstrual problems were excluded. The study was approved by the Health Sciences Research Ethics Committee of Hacettepe University (decision no: 2025/06-35, date: 04.03.2025).

Data Collection

Data were collected between June and December 2025 through an online, self-administered questionnaire. The study was conducted and coordinated by the Adolescent Medicine Division at Hacettepe University. Participants were recruited through two approaches: 1) adolescents and young adults presenting to the Adolescent Medicine outpatient clinic for a routine well child visit were invited to participate and provided with a questionnaire link/QR code, and 2) the same link/QR code was distributed via social media platforms to reach a broader population.

Sociodemographic characteristics (age, parental education level, and family income level) and menstruation-related information were collected using a structured, self-administered questionnaire consisting of multiple-choice questions. Participants were asked whether they had previously received information about menstruation and to indicate their primary sources of information (family, school/teachers, friends, internet/media, or other).

Menstrual Knowledge

Menstrual knowledge was assessed using a researcher-developed questionnaire consisting of multiple-choice items covering key domains of menstrual physiology in adolescents, including expected age range at menarche, normal menstrual cycle interval, average duration of menstrual bleeding, and daily number of menstrual pads/tampons used. Each item had one correct response, and correct answers were scored as 1 point, yielding a total knowledge score ranging from 0 to 4, with higher scores indicating greater menstrual knowledge. Participants who correctly answered all menstrual knowledge questions were classified as having complete menstrual knowledge. The correct responses to menstrual knowledge items were determined according to American College of Obstetricians and Gynecologists 2015 Committee opinion (1). According to these criteria, regular menstruation was defined as age at menarche between 10.5-15 years, menstrual cycle interval between 21-45 days during adolescence and 21-35 days in individuals more than 5 years post-menarche, menstrual bleeding duration between 2-7 days, and the use of 3-6 pads or tampons per day during menstruation. Accordingly, the questionnaire was adapted such that the normal menstrual cycle interval was presented as 21-45 days for early and middle adolescents, and 21-35 days for late adolescents/young adults.

Study Sample

The sample size was calculated based on previously reported knowledge gaps regarding normal puberty and menstrual patterns among Turkish schoolgirls by İşgüven et al. (4). Using G*Power software, with a significance level of 0.05, a statistical power of 80%, and 3 age groups, the minimum required total sample size was estimated as 241 participants. The final sample of 257 participants exceeded this threshold and was considered sufficient for the planned analyses.

Statistical Analysis

Descriptive statistics were presented as mean ± standard deviation for numerical variables and as number and percentage for categorical variables. The normality of distribution was assessed using Kolmogorov-Smirnov and Shapiro-Wilk tests. Non-normally distributed age data were compared between groups using the Mann-Whitney U test. Comparisons between two groups were conducted using Pearson's chi-square test or Fisher's exact test, as appropriate. Differences in menstrual knowledge across age groups were evaluated using Pearson's chi-square test. Effect sizes were

calculated using Cramér's V for chi-square and Fisher's exact tests, and rank-biserial correlation for Mann–Whitney U tests. A p value<0.05 was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 257 adolescents and young adults were included (77 early adolescents, 76 middle adolescents, and 104 late adolescents/young adults). The mean age was 17.48±3.96 years, and the mean time since menarche was 6.68±3.46 years. Age and time since menarche increased across developmental stages (Table 1).

Regarding parental education, university graduation was the most frequently reported education level for both mothers (n=105, 40.9%) and fathers (n=95, 37.0%). In terms of family income, the most reported level was average income (n=126, 49.0%). The sociodemographic characteristics of the participants are presented in Table 1.

Overall, 235 participants (91.4%) reported having received prior information about menstruation. The most common sources of information were parents (n=182, 70.8%), followed by internet/media (n=151, 58.8%) and school/teachers (n=150, 58.4%) (Table 1).

Participants who had received menstrual information showed significantly higher rates of complete menstrual knowledge compared to those who had not (n=151, 64.3% vs n=7, 31.8%; p=0.003). Similarly, menstrual knowledge score was significantly higher among those who had received information (3.66±0.59 vs 3.00±1.12; p=0.002). Age did not differ between two groups (p=0.610). Regarding specific knowledge components, adolescents who had received menstrual information demonstrated significantly higher correct knowledge of the age at menarche (n=218, 92.8% vs n=15, 68.2%; p=0.045) and the average duration of menstrual bleeding (n=226, 96.2% vs n=19, 86.4%; p=0.024). There was no significant difference between adolescents who had received menstrual information and those who had not in knowledge of the normal interval between menstrual periods (p=0.455) and daily number of menstrual pads/tampons used (p=0.102) (Table 2).

The proportion of participants who had received menstrual information did not differ significantly across age groups (p=0.402). In contrast, the frequency of correct menstrual knowledge increased across age groups. Complete menstrual knowledge was observed in 53.2% (n=41) of early adolescents, 56.6% (n=43) of middle adolescents, and 71.2% (n=74) of late adolescents and young adults. Post-hoc analyses indicated that the late adolescence/young adulthood group demonstrated significantly higher complete menstrual knowledge compared with both early and middle adolescence (p=0.029). Similarly, menstrual knowledge scores were higher in the late adolescence/young adulthood group compared to early adolescence and middle adolescence groups (p=0.003) (Table 3).

Discussion

One of the two key findings of our study is that although a large proportion of adolescents and young adults (91.4%)

Table 1. Sociodemographic characteristics and menstruation-related information

Characteristic	mean ± SD / n (%)
Age, years	17.48±3.96
Early adolescent	12.98±0.94
Middle adolescent	16.63±1.13
Late adolescent/young adult	21.42±2.46
Time since menarche, years	6.68±3.46
Early adolescent	1.28±0.68
Middle adolescent	4.76±1.56
Late adolescent/young adult	9.11±2.62
Mother's education level	
Illiterate	3 (1.2)
Primary school	44 (17.1)
Middle school	19 (7.4)
High school	49 (19.1)
University	105 (40.9)
Postgraduate	37 (14.4)
Father's education level	
Illiterate	0 (0.0)
Primary school	31 (12.1)
Middle school	22 (8.6)
High school	42 (16.3)
University	95 (37.0)
Postgraduate	67 (26.0)
Family income level	
Very poor	1 (0.4)
Poor	9 (3.5)
Average	126 (49.0)
Good	108 (42.0)
Very good	13 (5.1)
Received any information about menstruation	235 (91.4)
Source(s) of menstrual information*	
Mother/father	182 (70.8)
Friends	103 (40.1)
School/teachers	150 (58.4)
Internet/media	151 (58.8)
Other	6 (2.3)

*Multiple responses allowed

Table 2. Comparison of menstrual knowledge between adolescents who received menstrual information and those who did not

Characteristic	Received menstrual information (n=235)	Did not receive menstrual information (n=22)	Total (n=257)	p*	Cramér's V
Age, years, mean ± SD	17.42±3.12	18.02±6.12	17.48±3.96	0.610[a]	0.040[c]
Adolescents with complete menstrual knowledge, n (%)	151 (64.3)	7 (31.8)	158 (61.5)	**0.003[b]**	0.212
Age at menarche, n (%) <10.5 years 10.5-15 years >15 years Do not know	3 (1.3) 218 (92.8) 6 (2.5) 8 (3.4)	2 (9.1) 15 (68.2) 1 (4.5) 4 (18.2)	5 (1.9) 233 (90.7) 7 (2.7) 12 (4.7)	**0.045**	0.249
Normal interval between two menstrual periods, n (%) <21 days 21-45 days >45 days Do not know	14 (6.0) 211 (89.8) 1 (0.4) 9 (3.8)	3 (13.6) 18 (81.8) 0 (0.0) 1 (4.6)	17 (6.6) 229 (89.1) 1 (0.4) 10 (3.9)	0.455	0.100
Average duration of menstrual bleeding, n (%) <2 days 2-7 days >7 days Do not know	2 (0.9) 226 (96.2) 5 (2.1) 2 (0.9)	1 (4.5) 19 (86.4) 1 (4.5) 1 (4.5)	3 (1.2) 245 (95.3) 6 (2.3) 3 (1.2)	**0.024**	0.277
Daily number of pads/tampons used, n (%) <3 pads/tampons 3-6 pads/tampons >6 pads/tampons Do not know	18 (7.7) 191 (81.3) 6 (2.5) 20 (8.5)	5 (22.7) 13 (59.1) 0 (0.0) 4 (18.2)	23 (8.9) 204 (79.4) 6 (2.3) 24 (9.3)	0.102	0.191
Menstrual knowledge score, mean ± SD	3.66 ± 0.59	3.00 ± 1.12	3.61 ± 0.67	**0.002[a]**	0.215[c]

[a]Mann-Whitney U test, [b]Pearson Chi-square test, [c]Rank-biserial (effect size for Mann-Whitney U test)
*Fisher's Exact test

Table 3. Comparison of menstrual information status and menstrual knowledge by age group

	EA (n=77)	MA (n=76)	LAYA (n=104)	p	Effect size
Received menstrual information, n (%)	73 (94.8)	67 (88.2)	97 (93.3)	0.402[a]	0.096[c]
Complete menstrual knowledge, n (%)	41 (53.2)	43 (56.6)	74 (71.2)	**0.029[a]***	0.166[c]
Menstrual knowledge score, mean ± SD	3.38±0.87	3.47±0.76	3.72±0.58	**0.003[b]†**	0.037[d]

*EA-MA: 0.679, **EA-LAYA: 0.013, MA-LAYA: 0.043**
†EA-MA: 0.620, **EA-LAYA: 0.002, MA-LAYA: 0.007**

[a]Pearson Chi-square test, [b]Kruskal-Wallis test, [c]Cramér's V (effect size for Pearson Chi-square test), [d]Eta-squared (effect size for Kruskal-Wallis test)
EA: Early adolescent, MA: Middle adolescent, LAYA: Late adolescent/young adult, SD: Standard deviation

had received information about menstruation, less than two-thirds had complete menstrual knowledge. The other finding is that complete menstrual knowledge rates and menstrual knowledge scores varied significantly depending on the adolescence developmental stage. Considering that the menstrual cycle is a vital sign of women's health from menarche onwards, the insufficient knowledge may delay recognition of abnormal bleeding patterns and timely help-seeking.

In our study, the majority of participants reported having received menstrual information from at least one source. Parents were identified as the most frequently

reported source of information, followed by internet/media and school/teachers. The fact that parents are the primary information source may be related to their accessibility and reliability for adolescents, a finding consistent with previous literature (4,6). However, reliance on parents may also have limitations, as the accuracy and comprehensiveness of the information provided can vary depending on parental knowledge, beliefs, and potential sociocultural taboos surrounding menstruation. The second most common source was the internet and media which indicates that adolescents also seek information outside of face-to-face educational settings; which may introduce variability in the accuracy and consistency of information received. In addition, online sources may expose adolescents to misinformation, unverified content, and non-evidence-based recommendations, potentially leading to misconceptions and inappropriate health practices (7).

Notably, healthcare providers were not reported as a source of menstrual information in our study. This finding may reflect limited engagement of adolescents with healthcare services for preventive or educational purposes, as well as missed opportunities within clinical encounters to address menstrual health proactively. In many settings, menstrual health is not routinely discussed unless a specific complaint is raised, which may further limit adolescents' exposure to accurate, evidence-based information. In addition, the lack of adolescent medicine as a formally recognized subspecialty in Türkiye may further contribute to this gap, as structured, youth-focused preventive counseling is not systematically integrated into routine care (8). The absence of healthcare professionals as a reported source is particularly important, given their potential role in delivering standardized and reliable education. This highlights the need to integrate menstrual health counseling into routine adolescent healthcare visits and to adopt more proactive, developmentally appropriate communication strategies.

Although a large proportion of participants reported having received menstrual information, complete menstrual knowledge was identified in only 61.5% of the participants. While those who reported prior exposure to menstrual information demonstrated significantly higher knowledge levels than those who had not, nearly one-third of the informed group still exhibited incorrect or incomplete knowledge. This finding suggests that exposure to information alone does not always mean having accurate information. Consistent with this observation, the literature emphasizes that menstrual health knowledge is related not only to access to information but also to the understanding and application of that information in daily life. Studies show that interactive, structured interventions delivered through reliable sources are more effective and engaging than purely didactic or written approaches (9). A study conducted among grade 8-12 students in Canada demonstrated that menstrual health education not only improved knowledge but also increased confidence in menstrual health understanding, prioritization of menstrual health, and comfort in discussing menstruation (10). In another intervention study, a nurse-managed education program was observed to improve menstrual knowledge in adolescent girls and promote a more positive attitude and increase confidence (11). Importantly, several school-based intervention studies have demonstrated that structured menstrual health education delivered within the school setting significantly improves adolescents' knowledge, beliefs, and practices. For example, a school-based educational intervention conducted among adolescent girls reported a marked increase in menstrual knowledge scores after a 6-month programme (12). Similarly, some studies have shown that health education interventions implemented in schools lead to substantial improvements in both knowledge and menstrual hygiene practices compared with non-intervention groups (13). In this context, the Health Promoting Schools framework provides a comprehensive and effective approach for integrating menstrual health education into the school environment through coordinated curricula, supportive school policies, and engagement with families and communities (14). Integrating menstrual health education into this framework may help provide consistent, age-appropriate and stigma-sensitive learning and improve knowledge, attitudes, confidence, and health-seeking behaviors.

In our study, the significant increase in both complete menstrual knowledge rates and menstrual knowledge scores from early adolescence to late adolescence/young adulthood suggests that knowledge may develop over time through accumulated experience and repeated exposure to information. However, despite this increase, knowledge remained suboptimal even in late adolescence/young adulthood, where approximately one-third of participants still lacked complete menstrual knowledge. Existing literature indicates that many girls enter menarche insufficiently prepared, highlighting a critical gap in premenarcheal education (15). Cultural factors may further influence this process, as negative feelings such as embarrassment, fear, or anxiety about talking about menstruation, particularly during premenarche and early adolescence, can create substantial barriers to information acquisition (16,17). In this context, the relatively lower knowledge levels observed in

early and middle adolescence in our study, together with the persistent knowledge gaps observed even in late adolescence/young adulthood, underscore the importance of the premenarcheal and early postmenarcheal periods as critical windows for intervention, as well as the need for continued education across all developmental stages. By examining early, middle, and late adolescence and young adulthood as distinct developmental stages, our study provides insight into age-related differences in menstrual knowledge across a broader developmental spectrum. These findings support the need for developmentally adapted menstrual health education programs that target early adolescence before misconceptions become established and extend into later stages to address persistent knowledge gaps.

Study Limitations

This study has some limitations. First, due to its cross-sectional design, a causal relationship between prior exposure to menstrual information and menstrual knowledge levels could not be evaluated. Second, the fact that data were collected via an online, self-administered, multiple-choice questionnaire may have led to selection bias, including potential participation of individuals only who have digital access or a greater interest in the subject.

Conclusion

In conclusion, although most adolescents and young adults reported having received information about menstruation, complete menstrual knowledge was suboptimal. Knowledge levels increased with age but remained suboptimal, particularly during early and middle adolescence. Notably, healthcare providers were not identified as a source of menstrual information, highlighting a critical missed opportunity for delivering accurate and evidence-based education. These findings highlight the need for structured, developmentally adapted menstrual health education programs that provide accurate information and extend beyond simple information dissemination. Integrating age-appropriate menstrual health education into school curricula and routine adolescent healthcare checkups may facilitate earlier recognition of abnormal menstrual patterns, support informed health-seeking behaviors, and promote acceptance of menstruation as a physiological process, potentially reducing fear and anxiety. In this context, the formal recognition and expansion of adolescent medicine as a subspecialty may play a key role in strengthening youth-focused preventive care and ensuring the systematic delivery of developmentally appropriate health education.

Ethics

Ethics Committee Approval: The study was approved by the Health Sciences Research Ethics Committee of Hacettepe University (decision no: 2025/06-35, date: 04.03.2025).

Footnotes

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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