

The menstrual disorder of teenagers (MDOT) study: determining typical menstrual patterns and menstrual disturbance in a large population-based study of Australian teenagers

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Objective The aim of this study was to: (1) establish the typical experience of menstruation for senior high school girls and (2) determine how many experience considerable menstrual disturbance that could require further investigation and management of underlying pathology.

Design Cross-sectional study.

Setting Senior High Schools in the Australian Capital Territory (ACT), Australia.

Population A total of 1051 girls aged between 15 and 19 years.

Methods Data based on a quantitative survey.

Main outcome measures Self-reports of menstrual bleeding patterns, typical and atypical symptoms and morbidities.

Results Typical menstruation in adolescence includes pain (93%), cramping (71%), premenstrual symptoms (96%) and mood disturbance (73%). Highly significant associations were found between increasing severity of menstrual pain, number of menstrual-related symptoms, interference with life activities and

school absence. These associations indicate that approximately 25% of the sample had marked menstrual disturbance: 21% experienced severe pain; 26% school absence; 26% suffering five or more symptoms; $\geq 24\%$ reporting moderate to high interference with four out of nine life activities. Approximately 10% reported atypical symptoms associated with menstruation. Diagnosis of menstrual pathology in the sample was low, even though 33% had seen a GP and 9% had been referred to a specialist.

Conclusions Menstrual pain and symptoms are common in teenagers. Girls indicating moderate to severe pain in association with a high number of menstrual symptoms, school absence and interference with life activities should be effectively managed to minimise menstrual morbidity. Those girls who do not respond to medical management should be considered for further investigation for possible underlying pathology, such as endometriosis.

Keywords Adolescence, dysmenorrhoea, endometriosis, menstrual disturbance, menstrual pain, menstruation, teenage.

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Introduction

Teenage girls with menstrual pain regularly present to physicians. The experience of pain with menstruation is common for 70–91% of teenagers.^{1–6} Also, there are a number of physical, psychological and emotional symptoms that occur premenstrually and during menstruation, which are reported by 96% of teenagers.^{5,7,8} Menstrual pain and symptoms cause school absence in 14–51% of teenagers^{1,3–6,8–10} and interference with life activities for 15–59%.^{1–3,5,6}

Severe menstrual pain has been reported to occur in 14–23% of teenagers.^{1,4,5,7,9}

In those reporting severe pain there is a higher rate for school absences, which may be as high as 50–54%.^{4,9}

Endometriosis has been reported in 47–73% of adolescent girls with severe menstrual or pelvic pain with no response to non-steroidal anti-inflammatory drugs (NSAIDs) or the oral contraceptive pill (OCP).^{11–14} A number of teenage girls presenting to physicians with menstrual pain will be suffering from endometriosis, and take a

median of 12.1 years to obtain a diagnosis if aged ≤ 19 years, in comparison with women aged ≥ 30 years who will take 3.3 years to be diagnosed.^{15,16} In that time, the disease may prolong their studies, disrupt their career, affect their relationships, interfere with sexual function, cause infertility and lead to bowel, bladder or ureteric complications. The importance of decisions made by primary health clinicians concerning the treatment and referral of teenage girls with menstrual pain should not be underestimated.

As a result of the overlap between dysmenorrhoeic, premenstrual and some endometriosis symptoms there is difficulty distinguishing normal pain and symptoms from those that result from pathological disease. Although there is a continuing misconception that teenagers rarely have endometriosis the disease is increasingly being diagnosed in teenagers.¹⁷ An accurate non-invasive diagnostic tool is not yet available.

Although some large studies have examined menstrual pain and symptoms in teenagers, little research has been carried out to explore menstrual pain and indicators for menstrual disturbance requiring investigation. The aims of this study were to: (1) establish contemporary data on the typical experience of menstruation for a large teenage sample and (2) determine the number of teenagers suffering significant menstrual disturbance that requires management, and should potentially be investigated for underlying pathological disorders such as endometriosis.

Methods

Participants and setting

Four out of nine government senior high schools were selected based on their high number of enrolments, and were located in a North, South, East, West spread across the Australian Capital Territory (ACT). Participant and parent information sheets were distributed at en masse information sessions at the participating schools 1–3 weeks prior to data collection. Parents could elect for their daughters not to participate by signing and returning a 'Non-participation' section of the parent information sheet. Only five 'Non-participation' forms from parents were returned to the research team.

Questionnaire

The menstrual disorder of teenagers (MDOT) questionnaire was designed specifically for this study (see Appendix S1). The questionnaire took 20 minutes or less to complete, and was structured with repetitions in themes and questions throughout to gauge the consistency of responses. The questionnaire collected data about the characteristics of: a 'usual' period in terms of regularity, duration and heaviness; school absence due to menstruation; the pain experienced with

menstruation, and the use and effectiveness of analgesia; physical and emotional symptoms experienced during the menstrual cycle; interference of menstruation with various life activities; and true/false statements regarding various aspects and perceptions surrounding menstruation.

A mixture of question types were used, including single and multiple response, rating scales, true/false statements and, at the end, an open-ended question. The nine life activities listed in the interference section were: attending school; completing school work; social activities; sport and exercise; casual paid work; relationship with family; relationship with partner; relationship with friends; and sexual activity. Those participants whose questionnaire indicated a requirement for further investigation, and who consented to being contacted, were offered follow-up.

The questionnaire was piloted in eight age-appropriate girls, which resulted in alterations to the structure and order of some of the questions, as well as the addition of a glossary. The questionnaire was then piloted with a further 20 teenage girls, following which a formatting change to one of the questions required an additional page to be added (totalling six pages), which improved the overall layout and readability.

Procedure

For data collection, three schools provided access to all girls enrolled at the school. At the fourth school teachers could volunteer their class to participate, and girls were approached in the cafeteria on a given day. Two schools gave access during en masse gatherings in the school hall, a third school through English classes over a 2-day period to cover all girls enrolled in English, and the fourth school through various classes and the cafeteria. Girls present at school on the day of data collection were given a questionnaire and consent form on entering the hall, or 20 minutes before the end of class (after male students were dismissed). Teenagers signed a consent form before participating in the study, which was collected separately from the questionnaire for de-identification purposes. Completing the questionnaire was voluntary. Questionnaires were collected directly after completion and before leaving the hall or classroom to maximize the response rate.

Ethics and data analysis

Approval to conduct the study was obtained from the ACT Health Human Research Ethics Committee, the University of Canberra Committee for Ethics in Human Research, and the ACT Department of Education and Training. Data were entered into a Statistical Package for Social Sciences (SPSS) 14.0 database. Categorical data were assessed using chi-square tests, and one independent-samples Student's *t*-test was carried out. For these tests a *P*-value of < 0.05 was considered significant.

Results

There were a total of 1803 female enrolments at the schools selected for the study. At data collection (March 2005), 1071 girls were present and were given a questionnaire to complete, 1055 girls returned the questionnaire (16 were not returned) and four questionnaires were blank/incomplete, giving a response rate of 98%. The study sample of 1051 girls represented 36% of all government-enrolled females in the ACT. This is highly representative of this age group as 87.9% of females are retained at school to year 12, in the ACT.¹⁸

The age range of the sample was from 14 years 9 months to 19 years 3 months, with the average age being 16 years 10 months (± 8 months).

Typical menstrual bleeding patterns for the sample

The average age of menarche was 12 years 9 months (age range 8–19 years): 15.5% of girls menstruated before they were 12-years old, and 23.4% began after they were 13-years old.

Typical menstruation consisted of: regular menses in 62% ($n = 644$) of girls; a cycle length ranging from 21 to 35 days for 94% ($n = 455/484$); and menstrual bleeding lasting on average 5.93 days, with 1% bleeding for more than 10 days. Thirty-four percent of the sample reported spotting 'just before a period' and 5% 'in between periods'. Blood clots with menstrual bleeding were reported by 58% of the sample.

Menstrual symptoms

The top ten menstrual symptoms reported are described in Table 1.

Mood disturbance before or during a period was frequently reported, with 73% feeling grumpy, 65% feeling

down or depressed, 52% feeling teary, 32% overwhelmed/can't cope and 25% wanting to withdraw and hide.

Menstrual pain

Overall, 93% of girls reported pain with menstruation. Thirty-one percent ($n = 317$) reported no/mild pain (0–3 on rating scale), 48% ($n = 505$) reported moderate pain (4–7) and 21% ($n = 217$) reported severe pain (8–10). Self medication with analgesia was indicated by 66% ($n = 646$) of the sample, with the most popular choice being NSAIDs ($n = 501$), followed by paracetamol ($n = 378$) and aspirin ($n = 30$). Of those respondents who took analgesia, 85% ($n = 561$) reported moderate to high effectiveness (scoring 4–10 on a scale of 0–10, where 0 = not effective and 10 = highly effective). Eighteen percent ($n = 159/891$) of girls taking pain medication were also taking a combined OCP (COCP).

There were only 11 girls (1%) who reported asymptomatic periods, that is, no pain *and* no symptoms.

Presentation, investigation and diagnosis of teenagers with menstrual pain

Thirty-three percent ($n = 341$) of girls had consulted a GP in relation to their menstruation. Of all respondents, 22% ($n = 225$) reported taking the COCP. Specifically, 14% ($n = 138$) of the total sample reported taking 'the pill' for period pain. Nine percent ($n = 89$) had been referred to a specialist, <1% ($n = 9$) had an operation to look for causes of pain and 1% of girls reported a clinical diagnosis [eight reporting polycystic ovary syndrome (PCOS), two endometriosis and two were being investigated for endometriosis].

Menstrual interference with life activities

Twenty-six percent of the girls indicated that they missed school because of their periods. Of these, 2% reported time off school with every period. The majority of absences were for 1 day (70%), with 29% for up to 2 days and 1% of girls report missing up to 4 days of school. Of the girls who missed school, pain was the most common reason reported for school absence (94%). In the severe pain group, 50% of the girls reported missing school.

Menstrual interference with nine life activities is described in Table 2

Although menstruation on its own caused low interference with attending school for 88% of respondents (Table 2), when associated with menstrual pain school attendance was the most highly affected of the nine life activities (Table 3).

Association between menstrual symptoms and interference with life activities

Highly significant associations were found between severity of pain, the number of menstrual symptoms experienced,

Table 1. Top ten symptoms reported

Symptom	Frequency	Number of respondents	% (95% CI)
Feeling really tired	791	1019	78 (75–80)
Pelvic pain – cramping	701	986	71 (68–74)
Feeling down or depressed	654	1011	65 (62–68)
Headaches	641	1004	64 (61–67)
Bloating	618	1003	62 (59–65)
Pelvic pain – aching	604	976	62 (59–65)
Changes in appetite	607	1005	60 (57–63)
Lower back pain	580	1002	58 (55–61)
Pelvic pain – stabbing	370	917	40 (37–44)
Nausea	372	1002	37 (34–40)

Table 2. Interference of menstruation with nine life activities listed in order (percentage-wise) from highest reported interference to lowest reported interference

Activity	Number of respondents	N/A	High interference*	Low interference**
Sexual activity	1020	358	255 (38.5)	407 (61.5)
Sport and exercise	1030	37	336 (33.8)	657 (66.2)
Social activities	1027	23	262 (26.1)	742 (73.9)
Relationship with family	1031	31	237 (23.7)	763 (76.3)
Relationship with partner	1020	153	151 (19.7)	616 (80.3)
Completing school work	1031	32	158 (15.8)	841 (84.2)
Relationship with friends	1032	32	153 (15.3)	847 (84.7)
Casual paid work	1025	167	117 (13.6)	741 (86.4)
Attending school	1035	27	120 (11.9)	888 (88.1)

*High interference: 5–10 (on 0–10 rating scale).

**Low interference: 0–4 (on 0–10 rating scale).

Percentages are included in parentheses.

Table 3. Association between menstrual pain and menstrual interference with life activities

Life activity	Median			χ^2 (2df)	P
	Three pain categories				
	Mild	Moderate	Severe		
Attending school	0	1	3	116.2	<0.001
Completing school work	0	1	2	100.8	<0.001
Social activities	1	3	4	88.2	<0.001
Sport and exercise	1	3	5	55.4	<0.001
Relationship with friends	0	1	2	48.2	<0.001
Casual paid work	0	0	2	46.7	<0.001
Relationship with family	0	2	2	45.4	<0.001
Sexual activity	0	2	5	23.7	<0.001
Relationship with partner	0	0	2	14.5	0.001

Median interference score (0–10, i.e. from none to major) for three levels of pain, for each of nine life activities.

Table 4. Associations between pain severity, number of symptoms, interference with life activities and school absence related to menstruation

Variable 1	Variable 2	Test statistic	df	P-value
Pain	Symptoms	$\chi^2 = 215.4$	2	<0.001
Mild, moderate, severe	No/Yes			
Pain	School absence	$\chi^2 = 104.5$	2	<0.001
Mild, moderate, severe	No/Yes			
Pain	Interference	$\chi^2 = 91.1$	2	<0.001
Mild, moderate, severe	Low/high			
Symptoms	School absence	$\chi^2 = 120.4$	1	<0.001
No/Yes	No/Yes			
Symptoms	Interference	$t = 17.0$	1028	<0.001
No/Yes	Low/high			
Interference	School absence	$\chi^2 = 80.3$	1	<0.001
Low/high	No/Yes			

interference with life activities and school absence (Table 4).

Higher frequency or severity scores for the four variables in Table 4 were reported by approximately 25% of the sample: 26% reported school absence; 21% severe pain; 26% suffered five or more symptoms, $\geq 24\%$ reported high interference with four out of nine life activities.

Atypical symptoms

The responses to questions aimed at identifying atypical menstrual symptoms that could indicate underlying pathology are provided in Table 5.

Girls' perceptions of their menses

Forty-two statements were included in the true/false section to explore teenagers perceptions and attitudes

towards various aspects of menstruation, including: perceptions of normality/problems, consultation with other parties and investigations, menstrual hygiene products used, people they talk to about menses and moods experienced. Table 6 describes the main perceptions surrounding menstruation.

Discussion

This is a large population-based study with an extremely high response rate that has established the 'typical' experience of menstruation for a sample of Australian teenage girls in terms of pain, symptoms and menstrual disturbance.

Table 5. Atypical symptoms

Symptom	Frequency	Number of respondents	% (95% CI)
Pain when emptying bowels	116	996	12 (10–14)
Pain before or when passing wind	93	999	9 (8–11)
Pain with full bladder	190	992	19 (17–22)
Pain during or after passing urine	95	993	10 (8–11)
Pain during or after sexual intercourse	133	1007	13 (11–15)

Table 6. Girl's perceptions of their menses

Statements of perception regarding periods	Frequency	Number of respondents	% (95% CI)
I think my periods are normal most of the time	816	1041	78 (76–81)
My periods seem pretty normal	740	1037	71 (69–74)
I sometimes think there is something wrong with my period	279	1039	27 (24–30)
Periods worry me a lot	165	1025	16 (14–18)
I am sure there is something wrong with my periods	101	1039	10 (8–12)
I have had problems with my periods	360	1035	35 (32–38)

Menstrual bleeding patterns and pain

It would seem from the MDOT study that Australian teenagers are similar to teenagers around the world in terms of typical parameters for menstrual bleeding^{19,20} and reports of menstrual pain.^{1–6} Our study describes pain in 93% of respondents, which is higher than the 80% reported by Hillen *et al.* from a sample of 388 West Australian teenagers 10 years ago, and similar to the upper value in the range 70–91% commonly reported.^{1–6} The MDOT study has shown a change in the use of NSAIDs for pain relief within the last decade. In 1999, Hillen *et al.* reported 53% using simple analgesics and 42% using NSAIDs, in comparison with our study reporting 64 and 78%, respectively. Although 85% of respondents who took analgesia reported moderate to high effectiveness, this study did not examine whether pain medication was used in therapeutic doses. For the 15% who did not find medication effective, we were unable to determine the proportion that may be explained by inadequate dosing and

timing of analgesia, or an underlying pathology such as endometriosis that may not respond.

Association between menstrual pain, symptoms, school absence and interference with life activities

This study is the first to find highly significant associations between each and all of menstrual pain, menstrual symptoms, interference with life activities and school absence (Table 4). Girls who were reporting an increased severity of pain were also more likely to report more menstrual symptoms, more interference with their life activities and more school absence related to menstruation. At four years post menarche there are a significant number of girls reporting menstrual disturbance. Asking questions about these four factors could rapidly alert primary health carers to the girls who require more considered pain and symptom management, to improve menstrual morbidity.

Severe pain and school absence

Severe pain in our study (21% of girls) was consistent with the 14–23% reported in previous studies.^{1,4,5,7,9} Menstrual-related school absence of 26% was also consistent with the 14–51% reported in the literature.^{1,3–6,9,10} Of particular relevance is that half ($n = 106$) of the severe pain group also reported school absence, and 94% of the girls who miss school reported pain as the reason. This finding of an obvious relationship supports similar evidence in other studies.^{2,4,6,9,21} This is also consistent with the MDOT finding that menstruation alone caused little interference with school attendance and completing school work (Table 2). However, when menstrual interference with the nine life activities was associated with menstrual pain, attending school and completing school work scored the highest interference out of the nine life activities (Table 3). Keeping in mind that 44% ($n = 95$) of girls with severe pain had also seen a GP, investigating, treating and managing severe menstrual pain alone could considerably reduce the rates of school absence and interference with life activities associated with menstruation.

Possible endometriosis symptoms

Currently there is no prevalence figure for the number of teenagers who have endometriosis.

Although the MDOT study cannot definitively link reports of menstrual disturbance and atypical symptoms with secondary causes of pain without conducting laparoscopy and histological confirmation, there is a consistent subgroup of 5–15% of girls (Table 7) who are of concern and should be referred to a designated adolescent service for investigation of possible menstrual pathology.

There were 10% of the sample that were sure that there was something wrong with their periods, and approximately 10% who reported symptoms atypical for

Table 7. Frequencies of respondents causing most concern

	Frequency	Number of respondents	% (95% CI)
Sure there is something wrong with period	101	1039	10 (8–12)
Referred to specialist	89	1034	9 (7–10)
Two or more atypical symptoms	158	1051	15 (13–17)
Three or more atypical symptoms	66	1051	6 (5–8)
Take COCP to help period pain	138	1026	14 (11–16)
Take pain medication and COCP	159	891	18 (15–21)
Low effectiveness* of pain medication	96	646	15 (12–18)
Report severe pain** and school absence	106	1016	10 (9–12)
Report severe pain** and have seen GP	95	1024	9 (8–11)
Report severe pain**, take pain medication, take COCP	48	1039	5 (3–6)
Report severe pain** and low effectiveness* of pain medication	30	657	5 (3–6)

COCP, combined oral contraceptive pill.

*Report a score of 0–3 on a scale of 0–10. (i.e. from not effective to highly effective).

**Report a score of 8–10 on a scale of 0–10. (i.e. from no/mild pain to worst pain).

menstruation, and more commonly reported with endometriosis. Bowel and flatus pain are not common menstrual symptoms, and may be more common with peritoneal involvement around the bowel, that is Pouch of Douglas disease or, less commonly, distinct bowel involvement. These women may frequently be misdiagnosed as having irritable bowel syndrome (IBS).^{22,23} The association between endometriosis and IBS remains unclear in the literature.^{23–25}

Residual pain after emptying a full bladder is an obscure symptom that may be explained by endometriosis on the bladder after other causes such as urinary tract infections and interstitial cystitis have been eliminated. Pain with a full bladder during menstruation was surprisingly prevalent, reported by 19% of the sample. Dyspareunia may be linked to endometriosis, pelvic inflammatory disease (PID), sexually transmitted infections (STIs) and candidiasis; however, pain characteristics such as sharp or dull, superficial or deep, may be more helpful in distinguishing possible underlying pathology.

Rather than individual symptoms alone, it is the combination of presenting symptoms and a detailed health history, including the extent of menstrual disturbance, which is more important towards investigating a pathological cause for painful menstruation. Ongoing research may elucidate the sensitivity and specificity of individual symptoms.

There are consistent reports in the literature that 47–73% of teenagers reporting severe pain and poor response to medical management are found to have endometriosis. At the conservative end of this figure, and without attempted medical management, half of the severe pain group in our study equals 10.5%, similar to the 10% who

were sure there was something wrong with their periods and with those reporting atypical symptoms.

These findings suggest that the rate of endometriosis in teenagers could be as high as the 10% frequently estimated in adult women. Also, reports of pain in this study may be conservative, as 14% of the sample was already taking hormonal medication to reduce period pain.

Summary of findings and treatment recommendations

The MDOT study set out to establish the typical menstrual experience for Australian teenagers and determine menstrual disturbance in the sample.

‘Typical’ menstruation (approximately 75%)

‘Typical’ menstruation may be characterised by mild to moderate pain managed with analgesia, low interference with life activities, minimal school absence and manageable menstrual symptoms. Minimal treatment is required.

Menstrual disturbance (approximately 25%)

Menstrual disturbance may be characterised by: moderate–severe pain associated with menses; multiple menstrual symptoms; school absence; and high interference with life activities.

Treatment could involve optimizing first-line conservative measures, including the effective use of simple analgesics, such as NSAIDs with or without paracetamol in combination, and with or without hormonal medication. Lifestyle factors may be modified, such as diet and optimising bowel function, exercise and sleep patterns. Recording the frequency and intensity of pain and symptoms with a menstrual and symptom chart may add further

information, including symptom patterns and the effectiveness of some interventions.

Further investigation is required if symptoms are suggestive of endometriosis, that is, severe pain that may include bowel or bladder, dyspareunia, poor response to simple analgesia and/or hormonal medication, and significant interference with life activities. Adolescents with endometriosis may also present with acyclical pain.^{12,13}

The ultimate aim of treatment is for the restoration of full involvement in life activities. Protracted periods of unmanaged pain and interruption to life activities may cause depressive and anxiety symptoms, leading to further withdrawal from life activities. The repercussions of delayed diagnosis and under-management of symptoms on health-related quality of life are sufficiently documented.²⁶

Of note is that 15.5% of respondents reported menarche before the age of 12 years, and were likely to have been menstruating in primary school. This is similar to the UK study of 1166 girls aged 12–16 years, where 12% reported menarche before leaving primary school.²⁷ Based on this knowledge, menstrual education including the management of menstrual pain and symptoms should be included in the senior primary school curriculum. Although uncommon, endometriosis has been found in young girls investigated for severe pelvic pain prior to menarche, but post thelarche.^{14,28}

Low rate of investigation in sample

The rate of investigation for our sample seems low considering 35% indicated they had problems with their periods, 25% showed marked menstrual disturbance, and 33% had seen a GP about their menstruation. Only 9% of the sample have been referred to, or investigated by, a medical specialist, with only ten girls ($\leq 1\%$) able to report a clinical diagnosis for menstrual disorder (such as PCOS or endometriosis). In a sample of 1051 girls, more than 1% would be expected to have pathology of some sort, including those with PCOS.

Almost 10% of the sample had been referred to a medical specialist, which is a similar number to those presenting with atypical symptoms, and represents half of the severe pain group. The low rate of operation is probably related to the age of the sample, and may reflect the belief that there is unlikely to be serious underlying pathology, such as endometriosis, in teenagers.

Teenagers suspected of having endometriosis should be referred to a designated adolescent service that follows current best practice guidelines for diagnosing and treating endometriosis, such as those from the European Society of Human Reproduction and Embryology (ESHRE) and American College of Obstetricians and Gynecologists (ACOG).^{17,29} Girls can then be screened through comprehensive history taking, medical management and investigation, before deciding if surgery is necessary. A diagnosis of

endometriosis is more likely to be accurate when investigation and surgery are performed by specialists in teenage endometriosis, who are aware of the appearance of the disease in the younger population.^{28,30} Although it is prudent to be cautious with surgery in teenagers, those girls with ongoing menstrual morbidity that affects their daily functioning, and who have not responded to comprehensive management, should not be ignored. Some girls with highly suspected mild endometriosis may be well managed on hormonal medication for some time while there is minimal interference with daily functioning. As yet, there is a paucity of research comparing long-term outcomes of surgical versus medical treatment of endometriosis in teenagers.

This study has recognized factors, signs and symptoms that identify a group of girls suffering considerable menstrual disturbance. Future research is aimed at developing the MDOT questionnaire as a non-invasive screening tool or checklist that can be used by primary health carers and teenagers to identify girls requiring further investigation of menstrual disturbance. This will hopefully facilitate the earlier diagnosis of endometriosis or other disorders that require management.

Conclusion

Although typical menstruation in teenagers includes frequent reports of pain and menstrual symptoms, 78% consider their periods to be 'normal' most of the time. The MDOT findings have also shown the highly significant associations that signpost menstrual disturbance in approximately 25% of girls. Based on this knowledge, effective management of menstrual pain and symptoms could reduce menstrual morbidity considerably. At the same time, poor response to first-line management of menstrual pain would potentially facilitate earlier investigation and diagnosis of an underlying pathological disorder such as endometriosis. Once diagnosed, teenagers can be supported to treat and manage their disease, thereby minimising disruption to life activities during this critical time of development, ultimately preserving wellness and fertility in the long term. The importance of decisions made by physicians concerning the treatment and referral of teenage girls with menstrual pain should not be underestimated.

Disclosure of interests

None.

Contribution to authorship

Study conceived by MP and AS. MDOT questionnaire designed by MP and AS. All authors participated in the study design, data collection and interpretation of results. MP undertook data cleaning and analysis with assistance from a statistical consultant. MP drafted the manuscript with

critical revision provided by AS and PA. All authors approved the final version of the manuscript. MP is the guarantor.

Details of ethics approval

The ACT Health Human Research Ethics Committee, the University of Canberra Committee for Ethics in Human Research, and the ACT Department of Education and Training.

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Supporting information

The following supplementary materials are available for this article:

Appendix S1. The menstrual disorder of teenagers (MDOT) questionnaire.

Additional Supporting information may be found in the online version of this article.

Please note: Wiley-Blackwell are not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author. ■

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