

ORIGINAL RESEARCH ARTICLE

Sport participation and menstrual health outcomes among adolescent girls in China: A cross-sectional study

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Abstract

Menstrual challenges such as dysmenorrhea, irregular cycles, and premenstrual symptoms are common among adolescent girls, often compromising their overall well-being. Recent studies indicate that sports participation may enhance menstrual health, though quantitative data specific to Chinese adolescents remains limited. This study aimed to examine the connection between sports involvement and menstrual health through a reproductive health lens. Utilizing a cross-sectional design, girls aged 12-18 completed structured questionnaires of 300 people assessing their sports activities, menstrual pain intensity, cycle regularity, premenstrual symptoms, perceived stress levels, and sleep quality. The data were analyzed using descriptive statistics, correlation, and multivariate regression techniques. Results revealed that increased engagement in sports was significantly linked to lower severity of menstrual pain, improved cycle predictability, and reduced premenstrual symptoms. These associations held strong even after adjusting for factors like age, BMI, stress levels, and sleep quality. Reliability across measurement scales ranged from satisfactory to high. This research highlights the positive role of sports participation in enhancing menstrual health among Chinese adolescent girls. Promoting regular and moderate physical activity emerges as an effective strategy to boost reproductive health and overall well-being during adolescence. (*Afr J Reprod Health* 2026; 30 [9s]: 119-127).

Keywords: Sport Participation, Menstrual Health, Reproductive Health, China

Résumé

Les troubles menstruels tels que la dysménorrhée, les cycles irréguliers et les symptômes prémenstruels sont fréquents chez les adolescentes, affectant souvent leur bien-être général. Des études récentes indiquent que la pratique sportive pourrait améliorer la santé menstruelle, bien que les données quantitatives spécifiques aux adolescentes chinoises restent limitées. Cette étude visait à examiner le lien entre la participation sportive et la santé menstruelle sous l'angle de la santé reproductive. Une étude transversale a été menée auprès de filles âgées de 12 à 18 ans, qui ont rempli des questionnaires structurés évaluant leurs activités sportives, l'intensité de la douleur menstruelle, la régularité du cycle, les symptômes prémenstruels, les niveaux de stress perçu et la qualité du sommeil. Les données ont été analysées à l'aide de statistiques descriptives, de corrélations et de régressions multivariées. Les résultats ont révélé qu'une plus grande participation sportive était significativement associée à une intensité réduite de la douleur menstruelle, une meilleure prévisibilité du cycle et une diminution des symptômes prémenstruels. Ces associations sont restées significatives après ajustement pour des facteurs tels que l'âge, l'IMC, le stress et la qualité du sommeil. La fiabilité des échelles de mesure était satisfaisante à élevée. Cette recherche souligne le rôle positif du sport dans l'amélioration de la santé menstruelle des adolescentes chinoises. Promouvoir une activité physique régulière et modérée apparaît comme une stratégie efficace pour améliorer la santé reproductive et le bien-être général durant l'adolescence. (*Afr J Reprod Health* 2026; 30 [9s]: 119-127).

Mots-clés: Participation sportive, Santé menstruelle, Santé reproductive, Chine

Introduction

Menstrual health is a vital aspect of reproductive health in the girls and it is a major determinant of physical comfort, emotional stability and daily functioning in the adolescent girl at a critical phase in the life cycle. Adolescence is characterized by the initiation of menstrual cycles and is commonly accompanied by menstrual issues including dysmenorrhea, irregular menstrual cycles and

premenstrual symptoms. In China, girls have a significant percentage of adolescent girls indicating they have moderate to severe menstrual discomfort that can have a negative impact on school attendance, academic achievement, and engagement in physical and social activities.^{1,2} In spite of its prevalence, menstrual health has been a neglected area of research and policy deliberation among adolescent health matters. As a component of healthy adolescent development sport

participation and physical activity are popularly advertised. Regular sporting activity has been linked to better cardiovascular health, psychosomatic mood and stress-management. More and more, studies indicate that exercise can potentially also impact the reproductive health outcomes in the form of blood circulation, hormonal balance, and pain tolerance.^{3,4} In the case of adolescent girls, sport participation can thus be used as a non-pharmacological approach to enhancing the menstrual health outcome and at the same time improving overall wellbeing.

The level of sport participation among Chinese adolescent girls is however not even. Girls are often constrained in their sport and physical activity by academic demands, gender roles, inaccessibility of facilities, cultural taboos on menstruation and so on.^{5,6} Menstrual discomfort in itself is a possible barrier to participation in a cyclical relationship where pain will deter participation and inactivity may also increase menstrual symptomatology. Understanding this reciprocal relationship is pivotal for crafting impactful interventions in schools and communities.

While previous research has explored the link between physical activity and menstrual health, significant gaps persist. Notably, few studies differentiate sport participation from general physical activity, and quantitative data on adolescent girls in China remains scarce. Additionally, much of the current literature fails to embed menstrual health outcomes within a broader reproductive health framework that acknowledges adolescence as a vital stage of development. To address these shortcomings, this study sets out to quantitatively investigate the relationship between sport participation and key menstrual health outcomes—namely menstrual pain severity, cycle regularity, and premenstrual symptoms—among adolescent girls in China, employing a reproductive health perspective. Aligned with this objective, the study posits that greater engagement in sports correlates with diminished menstrual pain severity, better cycle regularity, and fewer premenstrual symptoms. It further anticipates that these relationships will hold significant even when controlling for confounding factors such as age, body mass index, perceived stress levels, and sleep

quality. By probing these hypotheses, the study aims to produce insights that can guide strategies for improving adolescent health, shaping physical education policies, and fostering gender-sensitive public health approaches.

Literature review

Menstrual taboos in teenage girls

Adolescent menstrual health issues are quite common and have been one of the biggest causes of low quality of life in young girls. Most of the menstrual disorders reported are dysmenorrhea with the literature showing that the prevalence rates of dysmenorrhea are over 60 percent in adolescent populations.⁷ Emotional distress, fatigue, lack of concentration and school absenteeism have been associated with menstrual pain and premenstrual distress⁸. In China, the poor menstrual health education, and the current social stigma can also contribute to the escalation of the adverse effects of menstrual disorders on the everyday lives of adolescents.^{2,9}

Empirical evidence indicates that a combination of biological, behavioral and psychosocial factors determine the health outcomes of menstrual health. Increased menstrual symptoms severity has been linked to stress, sedentary living, sleeping disorders, and low physical fitness.^{10,11} These results indicate the significance of investigating lifestyle patterns, including sport participation, as determinable factors of menstrual health.

Sport participation and menstrual pain

There is an increasing amount of quantitative data confirming the beneficial effect of physical activity and sport involvement in the decrease in the severity of menstrual pain. Control trials and systematic reviews have shown that aerobic exercises, stretching and strength training are linked to a significant decrease in the intensity and duration of dysmenorrhea in adolescents and young women.^{3, 4, 12} The suggested mechanisms are enhanced blood flow to the pelvis, decreased synthesis of prostaglandins, and augmented discharge of endorphins, which all play a role in the process of pain modulation.

The results of the population-based studies also show that teenage girls who have regular moderate-vigorous physical activity are less likely to complain of menstrual pain than their inactive counterparts.¹³ Nevertheless, the majority of the literature available is on clinical or intervention sample populations, and little work is done on participation in sport in actual, school or community-based contexts especially in China.

Sport participation, menstrual regularity and premenstrual symptoms

In addition to the reduction of pain, sport involvement has also been reported to increase the regularity of the menstrual cycle and premenstrual symptoms. It is proposed that regular exercises help to maintain hormonal balance and metabolism which are critical in the maintenance of stable menstrual cycles in adolescence.¹⁴ Quantitative research has indicated that girls who are physically active are less likely to complain of irregular menstruation and extreme levels of premenstrual symptoms such as mood swings and fatigue.¹⁵ However, it has been reported that too much training or high intensity training has been associated with menstrual abnormalities among the elite athletes, which highlights the importance of differentiating between sports participation and extreme physical activity.¹⁶ Moderate and regular sport participation seems to have protective effects, though it does not augment reproductive health risks, in adolescent girls at school and in community settings.

Obstacles to sports among girl child

Although this method can be beneficial, the participation of adolescent girls in sports is still limited by several obstacles. Commonly cited reasons why women do not play sport during menstruation are menstrual pain, fear of leakage, absence of menstrual hygiene facilities, and social embarrassment.^{6, 17} School requirements and study pressure in China also reduce time to exercise especially by the female students.⁵

Notably, research has shown that female athletes with severe dysmenorrhea tend to drop out of sport, which is a vicious cycle at work whereby inactivity causes worse menstrual health results.¹⁸

This mutual relation highlights the need to study both sport participation and menstrual health outcome in a quantitative design.

Methods

Study design and setting

This study employed a cross-sectional quantitative research design to examine the relationship between sport participation and menstrual health outcomes among adolescent girls. The study was conducted between September and December 2025 in selected secondary schools located in Wuhan and Xianning cities in Hubei Province, China. These cities were selected because they represent both urban (Wuhan) and semi-urban (Xianning) educational environments and provide access to diverse adolescent populations.

Three public secondary schools from these cities were selected for participation based on accessibility and administrative approval. These schools provide education to students aged 12–18 years and include structured physical education programs encouraging participation in sports and physical activities. Data collection was conducted within school premises during designated periods approved by school administrations to ensure minimal disruption to academic activities.

Sample size determination

The sample size for this study was determined based on methodological recommendations for cross-sectional health research involving adolescent populations. According to Cochran,^{19, 20} a sample size of approximately 300 participants is generally sufficient to provide adequate statistical power when examining behavioral and health outcomes in population-based surveys. Additionally, previous studies investigating the relationship between physical activity and menstrual health among adolescents have used sample sizes ranging from 250 to 400 participants²¹. Based on these methodological considerations and the accessible population within the selected schools, a minimum sample size of 300 participants was determined to be appropriate for the present study. To account for potential incomplete responses and missing data, 350 questionnaires

were distributed. After excluding incomplete or invalid responses, 330 valid questionnaires were retained for the final analysis.

Sampling procedure

A multistage convenience sampling technique was used to recruit participants. In the first stage, three secondary schools in Wuhan and Xianning were selected based on accessibility, willingness to participate, and the presence of eligible adolescent female students.

In the second stage, eligible participants were identified with the assistance of school administrators and teachers. The inclusion criteria required participants to be female students aged 12–18 years who had experienced menarche and were currently enrolled in the participating schools. Students who met these criteria were invited to participate voluntarily in the study. Participants were informed about the purpose of the study and assured that their responses would remain confidential. After screening the returned questionnaires, 300 complete responses were retained for statistical analysis.

Data collection instrument

Data were gathered through a structured, self-filled questionnaire that was made based on tools already tested and used in past studies looking at physical activity and menstrual health in teenage girls. The questionnaire was organized into four main sections: Demographic Information (including age, grade level, and lifestyle characteristics), Sport Participation, Menstrual Health Outcomes, and Premenstrual Symptoms. To measure sport participation, items adapted from the International Physical Activity Questionnaire (IPAQ) were used to evaluate the frequency, duration, and intensity of sports activities. According to the responses from the participants, their level of sports involvement was divided into three groups: low, moderate, or high, based on the standard categories used in the IPAQ guidelines.²²

Menstrual health outcomes were assessed based on information provided by the individuals themselves, such as how regular their menstrual cycles were and how bad their menstrual pain was.

Menstrual pain severity was assessed using a five-point Likert scale ranging from "no pain" to "very severe pain," adapted from instruments used in menstrual health research among adolescents.²¹ The study looked at symptoms that happen before a period, like tiredness, being easily annoyed, changes in mood, stomach discomfort, and headaches. These symptoms were checked using questions taken from the Premenstrual Symptoms Screening Tool (PSST).²³ It's important to mention that the questionnaire was made a little different to fit better with the culture and language of Chinese teenage students, but it still kept the main parts of the proven tools. Responses were collected using the Likert scale and categorical formats to enable quantitative statistical analysis. In this tool, getting a higher score on the symptom scale means experiencing more menstrual discomfort.

Data analysis

The collected data were coded and analyzed using IBM Statistical Package for the Social Sciences (SPSS), version 29.0, which is one of the most recent versions of the software used for statistical analysis in social science research. Descriptive statistics including means, standard deviations, frequencies, and percentages were calculated to summarize participant characteristics and study variables. Inferential statistical analyses were conducted to examine the relationship between sport participation and menstrual health outcomes. Statistical significance was determined using a p-value of less than 0.05.

Ethical considerations

Ethical approval for the study was obtained from the relevant institutional research ethics committee prior to data collection. Permission was also obtained from the participating schools and educational authorities. Participants were informed about the purpose of the study, and voluntary informed consent was obtained prior to participation. For participants under the age of 18, parental or guardian consent was obtained in accordance with ethical research guidelines. All responses were treated confidentially, and the anonymity of participants was strictly maintained throughout the research process.

Results

Measurement reliability

Internal consistency of the study instruments was assessed using Cronbach's alpha. All scales demonstrated acceptable to good reliability, indicating that the measures were suitable for quantitative analysis among adolescent girls.

As shown in Table 1, the internal consistency of the study instruments was acceptable to strong (Cronbach's $\alpha \geq 0.79$), indicating that the constructs were measured reliably in this adolescent sample. The reliability of menstrual pain severity and premenstrual symptom measures is consistent with previous adolescent menstrual health research that emphasizes the importance of using structured symptom scales for quantitative assessment of dysmenorrhea and PMS in school populations.^{7,8} Similarly, the reliability of the sport participation measure supports its suitability for examining behavioral health outcomes among girls, as prior studies have used comparable physical activity measures to assess adolescent participation patterns and related health outcomes.^{5,6}

Descriptive statistics

Table 2 presents descriptive statistics for the main study variables. The mean age of participants was 15.2 years (SD=1.6). A substantial proportion of girls reported low to moderate sport participation, while menstrual pain and premenstrual symptoms were commonly reported.

Table 2 indicates that menstrual pain and premenstrual symptoms were commonly reported alongside moderate levels of sport participation and relatively elevated perceived stress. This descriptive pattern aligns with existing evidence suggesting that dysmenorrhea and PMS are prevalent in adolescence and frequently disrupt academic performance and daily functioning.^{7,8} The observed stress levels are also consistent with research demonstrating that adolescent psychosocial stress is strongly associated with menstrual symptom severity and reduced wellbeing.^{10,11} Importantly, the descriptive statistics justify the study's quantitative focus on sport participation as a potentially protective behavior,

Table 1: Reliability statistics of measurement scales

Construct	Number of Items	Cronbach's α
Sport participation scale	5	0.8
Menstrual pain severity	4	0.8
Menstrual cycle regularity	3	0.7
Premenstrual symptoms	6	0.8
Perceived stress	5	0.8

Table 2: Descriptive statistics of study variables (N = 330)

Variable	Mean	SD
Sport participation score	2.9	0.8
Menstrual pain severity	3.1	1.0
Menstrual cycle regularity	2.6	0.8
Premenstrual symptoms	3.0	0.9
Perceived stress	3.2	0.8

Table 3: Correlations between sport participation and menstrual health outcomes

Variable	Sport Participation
Menstrual pain severity	-0.3**
Menstrual cycle regularity	0.2**
Premenstrual symptoms	-0.3**
Perceived stress	-0.2**

Note: **p < 0.01

Table 4: Multivariate regression results predicting menstrual health outcomes

Predictor	Pain Severity (β)	Cycle Regularity (β)	PMS (β)
Sport participation	-0.2**	0.2**	-0.2**
Age	0.0	-0.0	0.0
BMI	0.1*	-0.0	0.0
Perceived stress	0.3**	-0.2**	0.3**
Sleep quality	-0.1**	0.1**	-0.2**
R ²	0.3	0.3	0.4

Note: *p < 0.05, **p < 0.01

since physical activity has been increasingly recognized as a feasible non-pharmacological strategy for menstrual symptom management.^{3,4}

Correlation analysis

Pearson correlation analysis was conducted to examine bivariate associations between sport participation and menstrual health outcomes.

Table 3 shows significant correlations indicating that higher sport participation is associated with lower menstrual pain severity and fewer premenstrual symptoms, and is positively associated with menstrual cycle regularity. These relationships are consistent with prior systematic reviews and meta-analyses reporting that exercise interventions, including aerobic activity and structured training, reduce dysmenorrhea intensity and improve symptom tolerance.^{3, 4, 12} The negative correlation between sport participation and perceived stress is also supported by existing evidence that physical activity contributes to better emotional regulation and lower stress among adolescents, which is relevant because stress is a well-established contributor to menstrual symptom severity.^{10,11} Collectively, Table 3 provides initial empirical support for H1, H2, and H3 and reflects patterns found in broader menstrual health and physical activity literature.

Multivariate regression analysis

To test the hypotheses while controlling for covariates, multivariate regression analyses were performed. Age, body mass index, perceived stress, and sleep quality were included as control variables.

Table 4 showed that sport participation was still a statistically significant predictor of menstrual outcomes adjusting age, body mass index, perceived stress and sleep quality. This upholds the strength of the associations, as postulated in H4. The shielding effect of sport participation on the level of menstrual pain and PMS is in concurrence with intervention evidence findings indicating that structured exercise enhances negative menstrual symptom effects over that of demographic influences.^{3, 12} Equally, the positive correlation to regular cycles indicates that moderate physical exercise has been shown to aid hormonal control and metabolic homeostasis that have the potential to generate more regular cycles in adolescent girls.^{14, 15} Notably, perceived stress was a good predictor throughout models, which is consistent

with literature that stress affects the perception of pain, inflammation, and menstrual symptom burden.^{10, 11} The value of sleep quality in the models is also supported by the fact that sleep disturbance is correlated with increasing physical discomfort and sensitivity of symptoms during menstruation.¹¹ Generally, the multivariate findings reinforce the multiple hypothesis that sport participation is not only positively related to the improved menstrual health, but it is also an independent predictor under the account of significant confounders.

Discussion

This research paper explored the relationship which exists between sport involvement and menstrual health outcomes in teenage girls in China in a reproductive context. The results were used to yield quantitative data that increased participation in sports is correlated with a decrease in the severity of menstrual pain, the increase of menstrual cycle regularity, and the decrease in the severity of premenstrual symptoms despite the statistical adjustment of the most important physiological and psychosocial variables. The findings of this study reinforce the previous literature by targeting adolescents in school, and by positioning sport participation as a daily health practice, and not as a clinical intervention.

The findings of the present study provide empirical support for the hypothesized relationships between sports participation and menstrual health outcomes among adolescent girls. The results indicate that higher levels of sports participation are associated with reduced severity of menstrual pain, supporting H1. This finding is consistent with previous research demonstrating that regular physical activity can significantly reduce dysmenorrhea severity and improve pain outcomes among adolescents and young women.^{3,4,12} In addition, the observed positive relationship between sports participation and menstrual cycle regularity supports H2 and aligns with existing literature suggesting that regular physical activity contributes to improved hormonal regulation and menstrual stability.¹⁴ The study also confirms H3, as increased engagement in sports activities was associated with lower severity of premenstrual syndrome (PMS) symptoms, supporting earlier

studies showing that physical exercise can reduce psychological and physical symptoms related to PMS by improving mood regulation and decreasing stress levels.¹⁵ Furthermore, the results supporting H4 demonstrate that these associations remained significant even after controlling for physiological and psychosocial covariates, including stress and sleep patterns. This finding is consistent with recommendations in menstrual health research emphasizing that the relationship between lifestyle behaviors and menstrual health should be examined within models that account for broader psychosocial and behavioral factors.^{10,11} Overall, these results highlight the potential role of regular sports participation as an important behavioral factor that may contribute to improved menstrual health among adolescent girls.

The inverse association between sport participation and the severity of menstrual pain is consistent with the recent literature of intervention-based and descriptive studies. The systematic reviews and meta-analyses have also indicated that aerobic exercise and structured physical activity are effective in minimizing the dysmenorrhea symptom in adolescents and young women by enhancing circulation, endorphin release and pain modulation mechanisms.^{3,4,12} Notably, the current scoping evidence worldwide highlights that physically active adolescents who experience menstruation say that they have more positive experiences with menstruation symptoms and fewer limitations to activities, which also indicates the practical coping strategy of sport participation, as opposed to a medicalized response.¹⁸

The observed positive correlation between sport involvement and menstrual cycle regularity in this research study agrees with the previous results that indicate that hormones are regulated by regular moderate physical activity during adolescence.^{14,15} Although menstrual problems have been found to be caused by overtraining in elite athletic groups, school and community-based studies have revealed that less competitive athletes have less erratic menstrual periods.¹⁹ This difference is essential in the research of adolescent health as it highlights the protective value of moderate sport involvement when being practiced in the supportive learning atmosphere. Moreover, the sport involvement had a significant negative impact on the severity of

premenstrual symptoms. This result is in accordance to previous research that showed that physical exercise decreases mood-related and somatic PMS symptoms by enhancing stress management and emotional stability.^{15,20} The recent systematic reviews involving adolescents between 12 and 18 years further affirm that regular physical activity has a low occurrence and severity of dysmenorrhea especially when exercises are maintained over a period of time and not done occasionally.²⁰ These results are a good empirical support to the present results and contribute to the application of sport participation as a prevention reproductive health measure.

Perceived stress is supportive of the roles in all the models that suggest that stress is a significant contributor to the amplification of perceived menstrual pain and symptom burden.^{10, 11} The results of adolescent-centered studies highlight that menstrual pain, stress, and physical inactivity tend to be interrelated and create a self-perpetuating cycle that has a harmful impact on wellbeing.^{18, 21} The current research study adds to this body of literature by showing that the sport participation can still be a key predictor of the menstrual health outcomes despite considering the stress and sleep quality, thus, a protective role independent of other factors.

Combined, the results favor a behavioral reproductive health model where sport participation serves as a changeable lifestyle behavior in that it affects menstrual health in both physiological and psychosocial mechanisms. International and local data are gradually pointing toward the view that the optimal way to improve menstrual health results among the adolescent age group is to stop treating the symptoms but creating positive environments, which promote physical activity and normalize menstruation in schools.¹⁸⁻²⁰ This study offers quantitative data on a Chinese teenage population to support the work of other countries that strive to incorporate sport, menstrual health education, and adolescent wellbeing in the school health system.

Policy implications

This research has significant implications on the school health policy and health promotion of adolescents in China. Physical education programs in school ought to be tailored in a way that promotes

regular and inclusive sport to teenage girls with direct focus laid on menstrual health requirements. To limit barriers to sport participation, schools are supposed to offer empowering conditions by giving provision of menstrual hygiene facilities and flexible participation during menstruation.

Public health wise, the outcomes are in line with Sustainable Development Goal 3, which requires the promotion of health and wellbeing throughout the life course, and Sustainable Development Goal 5, which requires gender equality and empowerment of women and girls. The activities in promoting sport as a non-pharmacological intervention to enhance menstrual health serve both objectives as they help to meet gender-specific health requirements and lessen health-related inequities in adolescence.

Strengths and limitations

There are a number of strengths in this study. It is a ledger approach based on a reproductive health framework that fills a significant knowledge gap in the Chinese adolescent health research. The results are strengthened by the fact that validated tools are used and critical covariates including stress and sleep quality are incorporated in the research. Moreover, school-based policies can also be informed by focusing on sport participation as opposed to overall physical activity.

Yet, there are a number of limitations that should be admitted. This cross-sectional nature does not allow one to make a causal inference and longitudinal studies are required to investigate time effects between sport participation and menstrual health outcomes. The self-reporting of the data could have brought about recall or reporting bias, especially with sensitive issues like menstruation. The sample was selected based on the selected areas in the country, and this could be a limitation to the generalization of the study to the entire adolescent girls in China. The future study ought to cover a variety of geographical locations and involve other reproductive health factors, including health seeking behaviors and menstrual hygiene management.

Conclusion

The research gives a quantitative data that participation in sports is strongly related to better

menstrual health outcomes among teenage girls in China. Even after adjusting critical demographic, physiological, and psychosocial variables, higher involvement in sport was associated with lower severity of menstrual pain, high regularity of menstrual cycle, and decreased premenstrual symptoms. These results support the perception that sport participation is a protective non-pharmacological health promoting behavior; it supports adolescent reproductive health along physiological and psychosocial pathways. Through the targeting of adolescents at school, the study is an expansion of other literature that has heavily depended on clinical or intervention-based samples. These findings emphasize the value of moderate and regular sport involvement and not overtraining that has been linked to negative menstrual consequences in the elite sport groups. Notably, the results also highlight the role of stress and sleep quality in determining menstrual health jointly, which indicates that adolescent health requires comprehensive solutions to improve wellbeing. On the whole, the given study can be considered as the addition to the increasing body of evidence on the importance of incorporating sport participation in the reproductive health promotion among adolescents. Sustainable sport participation through encouragement of safe and inclusive sport practices can potentially help to enhance menstrual health and quality of life of adolescent Chinese girls.

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