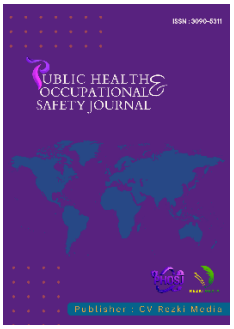

Effectiveness of 3D poster in improving menstrual hygiene knowledge among adolescent girls: A quasi-experimental study

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Received: 2025-01-04
Accepted: 2025-03-16
Published: 2025-05-01

A – Research concept and design
B – Collection and/or assembly of data
C – Data analysis and interpretation
D – Writing the article
E – Critical revision of the article
F – Final approval of article

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ABSTRACT

Background: Personal hygiene during menstruation is important and must be applied during the menstrual cycle. Suppose personal hygiene during menstruation is not maintained correctly. In that case, adolescent girls have the potential to experience health problems such as vaginal discharge, irritation of the genital area, allergies, inflammation, and Urinary Tract Infection (UTI). As many as 75% of women in Indonesia have experienced vaginal discharge once, while 45% have experienced it more than 2 times.

Objectives: This study aimed to determine the effectiveness of 3D posters in increasing knowledge about personal hygiene during menstruation.

Methods: The research method used was Research and Development (R&D), which was conducted through a pre-experimental approach with one group pretest-posttest. Ninety-five adolescent girls in class VII of State Junior High School 13 Malang participated in the study obtained using a purposive sampling technique. The research instrument used a closed-type questionnaire with 10 items to measure knowledge.

Results: The 3D poster product obtained a percentage value of media feasibility of 95% for the media aspect and 92% for the material aspect, which means it is very feasible to use. After the intervention, it is known that there is an effect of providing health education using 3D posters on the knowledge of adolescent girls regarding personal hygiene during menstruation according to the p-value = 0.000 from the Wilcoxon test.

Conclusions: Personal hygiene education during menstruation should be done more often to improve the knowledge of adolescent girls. The findings support the use of 3D media in menstrual health promotion, especially in schools with limited resources.

Keywords: 3D poster, genital area, menstruation, personal hygiene.

How to cite this article: Mustikawati, R., Rachmawati, W. C., Redjeki, E. S., & Ulfah N. H. (2025). Effectiveness of 3D poster in improving menstrual hygiene knowledge among adolescent girls: A quasi-experimental study. *Public Health and Occupational Safety Journal*, *1*(1), 40-52. https://doi.org/10.56003/phosj.v1i1.531

INTRODUCTION

World Health Organization (WHO) 2014 defines adolescence as between 10 and 19 years old. Permenkes RI No. 25/2014 states that individuals aged 10 to 18 are categorized as adolescents. Meanwhile, according to BKKBN, someone can be said to be a teenager if they are in the age range of 24 years and have never been married (Aulya et al., 2022). Adolescence is often considered a transition period from childhood to adulthood characterized by physical and mental changes. One of the changes is the development of reproductive organs, which occurs during menstruation in adolescent girls. During the menstrual cycle, hygiene is a fundamental thing that must be maintained by adolescent girls. Personal hygiene is an individual effort to maintain and improve personal hygiene and health, which aims for physical and psychological well-being by applying certain practices (Faj'ri & Wada, 2022).

However, when experiencing menstruation, there are still many adolescent girls who have not applied personal hygiene appropriately, which ultimately causes health problems, especially those that attack the female area and reproductive organs. According to the Riskesdas data in 2018, there are reproductive health problems in adolescent girls aged 10-14 years in Indonesia. It is recorded that around 43.4 million adolescent girls at that age mostly have bad habits in applying personal hygiene. Statistical data from research conducted by the Indonesian Ministry of Health stated that 52% of adolescent girls in 17 provinces in Indonesia experienced health problems due to a lack of compliance in maintaining personal hygiene during menstruation (Faj'ri & Wada, 2022). The results of research conducted by Faj'ri & Wada (2022) obtained data that showed that as many as 31 (64.6%) respondents had good personal hygiene habits that needed to be accompanied by adequate knowledge. Meanwhile, there are 42 respondents (64.6%) who have less knowledge of personal hygiene, which tends to have an impact on bad behavior. Lack of attention to personal hygiene during menstruation can lead to various health problems such as vaginal discharge, irritation of the genital area, allergies, inflammation, and urinary tract infections (UTI) (Hayati & Martilova, 2022).

Every month during menstruation, there are several health problems faced by women, including experiencing vaginal discharge 19%, itching in the genital area 25%, premenstrual syndrome 36%, discomfort during menstruation 35%, heavy menstrual blood 10% and experiencing abdominal cramps (Anand et al., 2015). About 75% of women in Indonesia have experienced vaginal discharge at least once, while 45% have experienced vaginal discharge two or more times. In East Java province, 75% of adolescent girls experience vaginal discharge (Narsih et al., 2022). One of the causes of vaginal discharge in adolescents is caused by unclean hygiene practices during menstruation (Anand et al., 2015). Continuous vaginal discharge can lead to trichomoniasis, cervicitis, and endometritis; even if it is not treated correctly, it will lead to infertility and cervical cancer (Muslim & Mulyani, 2023).

Women's health conditions during childhood to adolescence affect their health status when entering the reproductive period, namely during pregnancy, childbirth, and postpartum (Prijatni & Rahayu, 2016). Reproductive health problems in adolescents not only have physical consequences but also affect mental and emotional. These impacts can also be economically and socially detrimental in the long run. As a result, not only adolescents but also families, communities, and the country as a whole are affected (Hesty & Nurfitriani, 2023). The low implementation

of personal hygiene in adolescents is partly due to adolescents' lack of knowledge and information. According to data from the 2017 Indonesian Demographic Health Survey (IDHS), it was found that there was still a poor attitude among adolescent girls in applying personal hygiene during menstruation, with a percentage of 63.9%, which occurred due to a lack of knowledge and information (BKKBN et al., 2017).

The results of interviews at the Dinoyo Community Health Center found that out of State Junior High School 11 in the work area of the Puskesmas, State Junior High School 13 Malang is one of the schools that has never received health education related to personal hygiene during menstruation using interesting media aids. In addition, the school has a teacher who has received direct training on reproductive health from the Ministry of Health of the Republic of Indonesia. In October 2023, researchers conducted a preliminary study at the school. They found information that health workers had only conducted counseling on reproductive health in general and had not specifically discussed how to apply personal hygiene during menstruation appropriately. From interviews with several female students, it was revealed that the explanation of personal hygiene had come from parents. Steps that can be taken to enrich the insight of adolescent girls regarding personal hygiene during menstruation are through health education and the utilization of the media. Health education media is an important tool and effort in providing information and explanations about health aimed at the younger generation. The goal is to increase knowledge that is expected to influence the implementation of health practices so that their health status improves. Health education can be done personally or in groups through the use of audiovisual media, print media such as posters, leaflets, and booklets, as well as print mass media, including newspapers and magazines or electronic media such as TV and radio (Adyani et al., 2024).

Although the importance of personal hygiene during menstruation has been widely discussed, there is still a gap in the effectiveness of engaging and interactive educational media for adolescents. Most previous studies have focused on static media (Rahmad et al., 2023) or videos (Hayati & Martilova, 2022) without utilizing multisensory approaches like touch. In addition, the study by Pokhrel et al. (2020) in Nepal highlighted the lack of media-based education in rural areas but did not evaluate the impact of 3D media. This study fills this gap by empirically testing 3D posters, showing a significant increase in knowledge (p-value = 0.000) after the intervention. This finding aligns with the need for innovative media identified in the literature, such as the study by Anand et al. (2015), who emphasized the need for creative interventions to address adolescent reproductive health issues.

This study developed 3D poster media as an innovation in reproductive health education, especially personal hygiene during menstruation for adolescent girls. The study's novelty lies in using a 3D poster design equipped with interactive elements, such as embossed images and physical examples of underwear materials, to increase the involvement of the senses of sight and touch. This approach differs from previous studies using conventional media such as booklets, leaflets, or 2D posters (Anand et al., 2015; Sinaga et al., 2017). The study by Siregar and Nurjannah (2022) also showed that 3D media effectively improved students' understanding. However, this study expanded its application to menstrual health by validating media and material feasibility, reaching >90%.

This study aims to improve the knowledge of adolescent girls about personal hygiene during menstruation using 3D poster media. The results of the needs analysis conducted in November 2023 obtained from 23 children as many as 12 (52.2%) chose

posters as the most desirable media to be used as health education media than other media such as booklets, leaflets, flipcharts, picture cards, snakes and ladders and book covers. A poster is a communication tool used to express certain information, recommendations, or ideas to capture the attention of people who see it and provide a positive influence that can change their actions (Amperatmoko et al., 2022). The results of Siregar and Nurjannah's research (2022) found that 3D poster media is important in providing information that increases student learning motivation. The use of 3D posters helps facilitate the explanation of the material by the teacher, allowing students to better understand the material taught and creating a pleasant and supportive learning environment. Posters are also effective in attracting students' interest and visualizing information through attractive images, messages, and colors. Using posters in learning makes students more focused, enthusiastic, and excited and helps them not to feel bored quickly (Siregar & Nurjannah, 2022).

The 3D poster media has novelty compared to previous research with the title "The Effect of Menstrual Hygiene Health Education on Student Knowledge" by Tetik Nurhayati and Diah Laila Purwaningroom in the form of booklet media and research conducted by Ramadhani Anggi Wahyu entitled "Menstrual Hygiene Education as a Preventive Effort for Reproductive Health Disorders in Adolescent Girls" using poster media. The 3D poster will be made in A3 size using animated images that are attractive and readily accepted by children and teenagers, using pastel colors, and displaying material about the definition of personal hygiene during menstruation, the importance of applying personal hygiene, the impact of not applying personal hygiene during menstruation, types of sanitary napkins, how to clean disposable sanitary napkins, steps to apply personal hygiene during menstruation, and tips on choosing the right underwear for daily use. In addition, to further attract the target's interest, the animated images or illustrations on the media are made to be embossed or 3-dimensional, and on the material of tips on choosing underwear, panties with various types of different fabric bases are directly displayed so that the target can directly touch or touch the surface.

METHODS

Study Design and Participants

This research is a Research and Development (R&D). According to Sugiyono (2013), the research and development (R&D) method is used to make specific products and assess the effectiveness of these products (Azzahra & Septiaji, 2023). There are 10 stages in R&D research, including (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product trial; (7) product revision; (8) usage trial; (9) product revision; and (10) final production (Sugiyono, 2013). The R&D research model is carried out to determine the quality and effectiveness of the product design after passing the refinement procedure and validation test conducted by experts. Products made will be tested using a Pre-Experimental Design approach conducted through a one-group pretest-posttest Design within 2 weeks to see the differences in knowledge experienced by the target.

The implementation of the research took place from April to May 2024, located at State Junior School 13 Malang. There were 125 or all female students in class VII who were included in the population of this study. The sampling technique used was the purposive sampling technique. The sample in this study amounted to 95

respondents obtained by the Slovin formula. This selection was based on the consideration that grade VII students (age range 12-14 years) were chosen because they were in the early phase of menstruation (menarche), which generally occurs at the age of 11-13 years (Kholifah, 2015). At this stage, adolescent girls tend not to have adequate knowledge about menstrual personal hygiene, so educational interventions are more effective early on. Based on the preliminary study, State Junior High School 13 Malang has never provided special education on menstrual personal hygiene with attractive media (interviews with teachers and health workers). This creates a knowledge gap that needs to be filled, as identified in a similar study in Nepal (Pokhrel et al., 2020), highlighting the lack of access to information in new menstruating adolescents. The purposive sampling allowed the researcher to focus the intervention on the group most in need (schoolgirls with no prior education), allowing the study to more accurately measure the impact of the 3D poster (Sugiyono, 2013).

Ethical approval statement

This research has received ethical approval from the State University of Malang Health Research Ethics Committee with letter number No. 6.2.3/UN32.14.2.8/LT/2024. All participants, parents, and guardians of students have explained the objectives and procedures of the study, and a written consent sheet (informed consent) was signed before the data was collected. This study guarantees the confidentiality and anonymity of all participant data.

Research Instruments

A questionnaire with a closed question type consisting of 10 questions was used to assess the respondents' knowledge, and the results were valid after the validity test. After that, it continued with the reliability test, which obtained a Cronbach's alpha (α) value of 0.734.

Data Analysis

Statistical analysis was performed using a non-parametric test, the Wilcoxon test. When the normality test was carried out, the data on personal hygiene knowledge during menstruation were not normally distributed.

RESULTS

Respondent Characteristics

The criteria for respondents in this study consisted of the age of the respondent and the source of information presented in Table 1.

Table 1. Respondent Characteristics

	Frequency	Percentage (%)
12 Year	13	13,7
13 Year	76	80
14 Year	6	6,3
Total	95	100

Source: Primary Data, 2024

The data in Table 1 above indicates that most respondents, 76 people or 80%, were in the 13-year age group.

3D Poster Media on Menstrual Personal Hygiene

The following is the initial design of the 3D poster product and the final design after two stages of design revision.

Figure 1. Product Design

Figure 2. Revised Design

After the researchers revised the design, a feasibility test was conducted with the following results.

Table 2. Feasibility Value of 3D Poster Media Products on Menstrual Personal Hygiene

	Total Score	Feasibility Score Percentage (%)	Category
Media Expert	57	95%	Very feasible
Material Expert	55	92%	Very feasible

Source: Primary Data, 2024

The results in Table 2 describe the findings of the media feasibility test in the form of 3D posters related to personal hygiene during menstruation in the media aspect, and a total score of 57 (95%) was obtained from media experts. For the material aspect, a total score of 55 (92%) was obtained from the material expert, indicating that the 3D poster product is expected to be used and accepted by the target.

Univariate Analysis

Univariate analysis in this study evaluated the differences in knowledge levels before and after health education with 3D posters, as listed in Table 3.

Average Knowledge of Respondents Regarding Personal Hygiene During Menstruation Before and After Receiving Health Education Through 3D Posters

Table 3. Average Knowledge of Respondents Regarding Personal Hygiene During Menstruation Before and After Receiving Health Education Through 3D Posters

	N	Range	Min	Max	Mean	SD	SE
Pre-test	95	70	30	100	65,89	16,916	1,736
Post-test	95	80	20	100	79,16	16,801	1,724

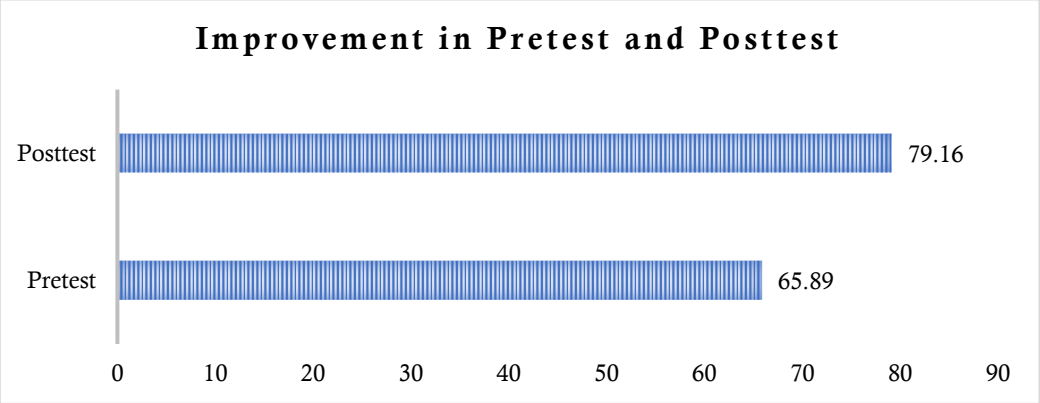

Figure 3. Improvement in scores before (Pretest) and after (Posttest) receiving health education through 3D posters

The analysis results in Table 3 show a significant increase in respondents' knowledge after the 3D poster intervention. The pretest means score (65.89 ± 16.916) increased to 79.16 ± 16.801 at the posttest, with a difference of 13.27 points. The relatively stable standard error (pretest: 1.736; posttest: 1.724) indicates the consistency of the data. This finding proves the effectiveness of 3D posters in improving understanding of menstrual personal hygiene (p-value = 0.000) by similar studies using interactive visual media (Anand et al., 2015; Siregar & Nurjannah, 2022).

Differences in Knowledge of Personal Hygiene During Menstruation After Education Through 3D Poster

Table 4. Wilcoxon Signed Ranks Test Results

	N	*Mean Ranks*	Sum of Ranks
Negative ranks	13	35.08	456.00
Positive ranks	65	40.38	2625.00
Ties	17		
Total	95		

Table 5. Wilcoxon Test Output

	Pretest-Posttest
Z	-5.462
Asymp. Sig. (2-tailed)	0.000

The results of the Wilcoxon test in Tables 4 and 5 show that the pretest and posttest results of knowledge obtained by utilizing 3D poster media were p-value = 0.000. Thus, there is a difference between the pretest and posttest values.

DISCUSSION

The findings of this study indicate that the respondents are in the age range of 12 to 14 years, with the majority being 13 years. Researchers chose respondents with an age range of 12-14 years, referring to the average age of adolescents in Indonesia when experiencing first menstruation, which ranges from 11.2-13.4 years with a minimum age of 9 years and a maximum age of 15 years (Kholifah, 2015). Information about personal hygiene during menstruation in this study came from mothers, older sisters, peers, neighbors, and health workers, with the most distribution of information from mothers. The role of parents is vital in helping and providing information in dealing with puberty, especially maintaining personal

hygiene during menstruation. According to Pokhrel et al. (2020), a study in Nepal revealed the important role of mothers as a source of information in promoting personal hygiene among women or adolescent girls with special needs during the menstrual period. Based on the study results, most respondents received health education about personal hygiene during menstruation without going through the media. However, some respondents received health education through media and mostly through videos.

From this study, it can be concluded that the pattern of habits during menstruation carried out by the respondents is that many experienced health problems in the form of itching. This can be caused by adolescents who do not immediately change pads full of menstrual blood or sweat that comes out and moistens the area around the womanhood. Bacteria and fungi can multiply in the moist feminine area and eventually cause itching and irritation (Faj'ri & Wada, 2022). Based on the study's results, it is also known that during menstruation, respondents mainly change disposable sanitary napkins after school. The recommended time to change sanitary napkins is every 2-4 hours, especially during menstruation on days 1-2, when blood is flowing heavily, and during activities (Sinaga et al., 2017).

The respondents mostly used disposable sanitary napkins; many did not know about cloth-based reusable napkins. According to a study conducted by UNICEF in 2015, the majority of adolescent girls during menstruation prefer to use disposable sanitary napkins. The available data indicates that in urban areas, the usage rate reaches more than 99%, while in rural areas, it is more than 97%. As for the users of re-washable cloth pads, about 9.6% of adolescent girls in rural areas and 5.5% in urban areas (Sinaga et al., 2017). Most wash disposable sanitary napkins with running water to clean them. The majority of respondents often use cotton underwear daily. The type of cotton underwear is expected to help air circulation in the female area to be smooth (Djuang et al., 2021).

The 3D poster media made before being tested directly on the target first went through the material and media validity test stages by experts. The expert's product assessment results stated that both aspects were classified as very feasible criteria because they showed a percentage of eligibility values >81%. It can be concluded that 3D poster media about personal hygiene during menstruation has very feasible criteria that are inseparable from suggestions and input from experts so that it can be continued for field trials. Notoatmodjo, in 2012, argues that poster media is designed to disseminate information and encourage people to follow the actions described or described in the poster. Posters in health education are intended as an indirect communication tool that allows counseling without requiring direct contact between the instructor and the subject, but only through visual posters. It is included in the health education method that focuses on the sense of sight, where knowledge is obtained through observation of particular objects (Gobel et al., 2024).

Posters, a blend of images and text with vibrant color combinations are designed to captivate and engage the audience, thereby increasing the effectiveness of the message. They serve as a visual gateway to information, sparking interest and enhancing content comprehension (Jatmika et al., 2019). The 3D poster products, with their embossed illustrations that depict real conditions, are particularly engaging, attracting interest and enhancing the respondents' memory of the information presented.

After direct testing on 95 individuals, pretest and posttest data were obtained and analyzed using the Kolmogorov-Smirnov normality test. The pretest and posttest

significance values were 0.000 or <0.05, meaning the data was not normally distributed. Therefore, the data analysis was continued by conducting the Wilcoxon test. The results of the Wilcoxon test showed that as many as 13 respondents got a negative rating, indicating a decrease in scores from the pretest and posttest. Meanwhile, 65 respondents with positive ratings indicated an increase in scores from the pretest and posttest. The Wilcoxon test results state a p-value = 0.000, so the p-value <0.05 means there is a difference in knowledge scores before and after intervention through 3D posters. This indicates that the use of 3D poster media impacts respondents' knowledge. Therefore, health education through 3D poster media effectively increases knowledge about personal hygiene during menstruation.

3D posters in health education about personal hygiene during menstruation make it easier for targets to understand the information provided, compared to only delivering information verbally. 3D posters play an important role in delivering information because they have a display that attracts respondents' attention. During the health education, the respondents responded positively and enthusiastically to the 3D poster media used. This can be seen from those who are curious about one of the components on the poster, namely the sub-material examples of underwear with various types of basic fabric materials displayed using real fabric materials so that respondents can feel the surface directly and can judge for themselves what fabric material is most appropriate for use as underwear. The research revealed that only a small proportion of respondents had been exposed to information about personal hygiene during menstruation with the help of media aids. After the intervention in the form of providing health education through 3D posters, there was an increase in knowledge possessed by adolescents. This can occur because the 3D poster media utilized the senses of hearing and vision and the sense of touch, which is very helpful in remembering the information provided.

The results of this study are in line with research with the title "The Effect of Poster Media Education on Personal Hygiene Knowledge of Female Students During Menstruation at Pondok Pesantren Assalam Manado City," which was carried out using the one-group pretest-posttest design method and involved 18 samples, using an instrument in the form of a questionnaire and then analyzed with the MC-near test which obtained the results of a value of $p = 0.000$ or $<\alpha = 0.05$, which means that the use of posters as educational media has an influence on knowledge about personal hygiene during menstruation for female students at Pondok Pesantren Assalam Manado City (Gobel et al., 2024). The results of this study are also corroborated by previous research entitled "Utilization of Leaflets and Posters as Balanced Nutrition Education Media Towards Increasing Knowledge and Attitudes of Adolescent Girls in Aceh Besar" explained that after being given an intervention in the form of a poster, there was an increase in the average knowledge among adolescents of 5.44 for leaflets and 5.50 for posters. Statistical analysis results indicated a significant difference ($p < 0.05$). This finding proves that health counseling or education activities that utilize leaflets and posters have succeeded in increasing the knowledge of adolescent girls about balanced nutrition (Rahmad et al., 2023).

This study highlighted the importance of personal menstrual hygiene education, but the policy recommendations for agencies such as the Health Office or the Ministry of Health were general. For example, there is no technical direction for integrating 3D posters into the reproductive health curriculum in schools or training teachers or health workers in using this innovative media. A similar study in India

(Anand et al., 2015) recommended collaboration between schools and health offices to distribute educational media, which was not described in this study.

Limitations of the study

However, this study has limitations. The sample was limited, involving only female students of State Junior High School 13 Malang, so the results cannot be generalized to populations with different characteristics (for example, rural areas or young women not attending school). In addition, it did not consider external factors such as the role of parents or access to menstrual products that might affect the results.

CONCLUSIONS

After receiving health education through 3D posters, adolescents' knowledge of personal hygiene during menstruation has increased. This proves that the use of 3D posters has an impact on increasing the knowledge of female students of State Junior High School 13 Malang regarding personal hygiene. The school should be able to conduct more health education or deliver personal hygiene information during menstruation to female students. Health workers from the health center or health department can also further develop more attractive health promotion methods and media to attract the interest of target students to understand and apply personal hygiene related to menstruation, not only for adolescent girls but the entire community.

Expanding the scope of this study is important by including additional variables such as aspects of attitude and behavior by using various other media aids such as leaflets, booklets, and flipcharts. It is also expected to examine the impact of 3D media on knowledge, attitudes, and behaviors regarding menstrual hygiene practices (for example, frequency of changing pads and product selection). Health promoters can conduct more health promotion activities to promote awareness and knowledge in the school community on implementing personal hygiene during menstruation that can involve the closest people.

ACKNOWLEDGMENTS

The research team would like to thank the Head of State Junior High School 13 Malang, Mrs. Susan Sinthian, M.Pd, Puskesmas Dinoyo, and the State University of Malang for valuable support during this research.

DATA AVAILABILITY

The data used and/or analyzed in this study are available from the correspondence author upon reasonable request. Data are not publicly available for the participants' privacy and data protection purposes (school-aged adolescent girls).

FUNDING

This research did not receive external funding.

CONFLICT OF INTEREST

The authors declare that there is no potential conflict of interest related to the implementation, analysis, and publication of the results of this study. The entire research process and article writing were conducted independently without any pressure or influence from any party.

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