



Usability and Acceptability of a Co-Designed Menstruation Tracker App for Indonesian Adolescent Girls

Arlyana Hikmanti^{1,*}, Martyarini Budi Setyawati¹

¹Faculty of Health Sciences, Universitas Harapan Bangsa, Indonesia

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ABSTRACT

Background: Many adolescent girls experience limited access to accurate and age-appropriate menstrual health information, which may contribute to anxiety, stigma, and suboptimal menstrual hygiene practices. Existing menstrual tracking applications are often designed for adult users and may not address adolescent needs in local cultural contexts. **Objective:** This study evaluated the perceived usability and acceptability of Srikandi Sehat, a co-designed menstruation tracker application for Indonesian adolescent girls. **Method:** A prospective usability evaluation was conducted among 151 adolescent girls aged 13-18 years who used the application during three menstrual cycles. The application was developed through a co-design process involving adolescent users and health workers. Data were collected using electronic questionnaires on menstrual knowledge, technology-related attitudes, and application usability. Descriptive statistics and Spearman correlation analyses were used because knowledge and usability scores were not normally distributed. **Results:** The modified usability scale showed a mean total score of 133.35 out of 160 (SD 19.72), indicating favorable perceived usability within the scoring framework used in this study. Participants reported that the application was easy to navigate, visually understandable, age-appropriate, and useful for recording menstrual cycles and symptoms. Attitude toward menstrual health showed a stronger association with usability (ρ approximately 0.53, $p < 0.001$) than knowledge (ρ approximately 0.21, $p = 0.010$). These findings indicate association rather than causation. **Conclusion:** Srikandi Sehat was perceived as usable and acceptable by participating adolescent girls. Further studies should validate the adapted instruments, include objective usage analytics, and evaluate educational or behavioral outcomes using controlled and longer-term designs.

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Corresponding Author:

Arlyana Hikmanti, Faculty of Health Sciences, Universitas Harapan Bangsa, Indonesia

Email: arlyanahikmanti@uhb.ac.id

1. INTRODUCTION

Menstruation is a fundamental aspect of adolescent reproductive development and can influence physical comfort, psychological well-being, school participation, and self-care practices. In low- and middle-income countries, limited access to accurate menstrual health information may contribute to anxiety, stigma, and inadequate menstrual hygiene practices [1], [2]. In Indonesia, many adolescent girls receive insufficient

preparation before menarche, which may lead to uncertainty in recognizing normal menstrual patterns, managing symptoms, and seeking appropriate healthcare when problems arise [3]. Previous educational interventions have also demonstrated that structured menstrual health education significantly improves adolescents' menstrual knowledge and preparedness [8]. Digital health interventions have become increasingly relevant for adolescents because mobile phones are familiar, private, and potentially scalable channels for reproductive health education, particularly in low- and middle-income countries where mobile-based interventions have expanded access to sexual and reproductive health information [4], [10]. Many menstrual tracking applications are designed for adult users and emphasize cycle prediction, lifestyle monitoring, or fertility-related functions rather than adolescent-centered education and symptom self-management.

Previous studies and systematic reviews have demonstrated the potential of mobile-based reproductive health and menstrual health interventions for adolescents and young people across diverse settings [5], [9]. Menstrual health applications can also enhance health literacy when they provide accurate, user-centered content that addresses users' informational needs [4], [6]. The UNICEF Oky application is an example of an adolescent-centered menstrual health application that actively involved girls in the design process while emphasizing local relevance [7]. Several research gaps remain. Evidence from Indonesian adolescent users is still limited, particularly regarding applications that integrate menstrual cycle tracking, symptom monitoring, culturally sensitive education, and self-management guidance. The usability of such applications across multiple menstrual cycles also requires empirical evaluation because initial user interest does not necessarily translate into sustained engagement or satisfactory user experience.

To address these gaps, the research team developed Srikandi Sehat, a menstrual health application that provides a menstrual calendar, symptom logging, reminders, and educational content covering menstrual physiology, menstrual hygiene, symptom management, and appropriate help-seeking. The application was developed using a co-design approach involving adolescent girls and local healthcare workers to improve age appropriateness, language clarity, and contextual relevance. This study contributes empirical evidence on the usability of a locally co-designed Indonesian menstrual health application among adolescent girls across three consecutive menstrual cycles. The study aimed to evaluate the perceived usability and acceptability of Srikandi Sehat and to examine the associations among menstrual knowledge, attitudes toward menstrual health, and perceived usability. The effectiveness of the application in improving menstrual knowledge or self-management behaviors was beyond the scope of this study.

2. METHODS

2.1. Research Design

This study employed a prospective usability evaluation design with a three-cycle observation period. Adolescent girls aged 13–18 years were enrolled and instructed to use the Srikandi Sehat application to record menstrual bleeding and associated symptoms across three consecutive menstrual cycles. The study design was intended to capture user experiences following repeated interaction with the application rather than after a single-session usability assessment. The analyses focused on perceived usability, acceptability, and the associations among questionnaire scores. The findings should not be interpreted as evidence of application effectiveness or behavioral change.

2.2. Research Procedures

The study procedure consisted of four stages: application co-design, participant recruitment, application use during three menstrual cycles, and post-use questionnaire completion. The final analytic sample included participants who completed the required application-use period and electronic questionnaires.

a. Co-design stage of the application

The Srikandi Sehat menstrual health application was developed using a co-design approach involving adolescent girls aged 13–18 years, village midwives, community health workers, and the research team. The development process began with discussions to identify adolescents' informational needs, barriers to menstrual self-care, language preferences, and desired application features. Eleven adolescent participants subsequently interacted with low-fidelity prototypes and provided feedback on interface clarity, menstrual calendar and symptom tracking functions, language options, reminders, and educational content. Their feedback resulted in a simplified interface, improved menu navigation, clearer language, and the inclusion of self-management guidance that reflected local practices. The final application included a menstrual calendar, symptom tracking, educational modules on menstruation and menstrual hygiene, reminders, and self-management guidance.

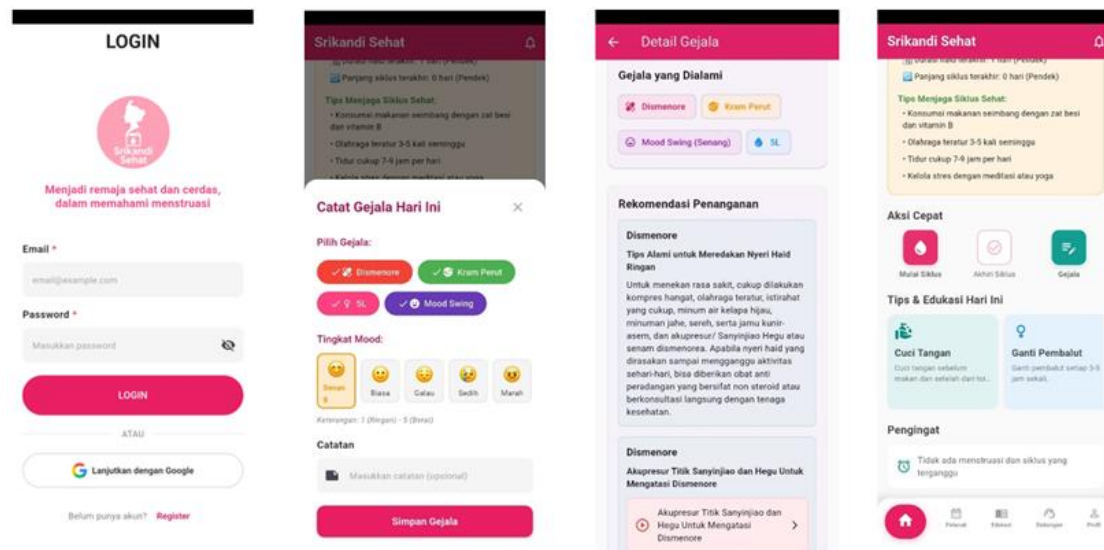


Fig. 1. Srikandi Sehat Application Home Screen

b. Participants and recruitment

The target population was adolescent girls aged 13-18 years who had experienced menarche and had access to an Android smartphone, either personal or shared, capable of installing and running the application. Exclusion criteria were significant visual or cognitive limitations that prevented independent application use, as reported by parents, guardians, or teachers. Recruitment was conducted through selected junior high schools and community-based adolescent groups in rural and urban areas in collaboration with local health centers and school administrators. These sites were selected to capture variation in health information access, digital device access, and school or community health support. The final sample consisted of 151 adolescent girls who completed the usability assessment. Participants with incomplete questionnaires or incomplete application-use records were excluded from the final analysis. The recruitment flow in Figure 2 should be checked against the original field log before final submission to ensure that the numbers of invited, consented, withdrawn, incomplete, and analyzed participants are fully consistent.

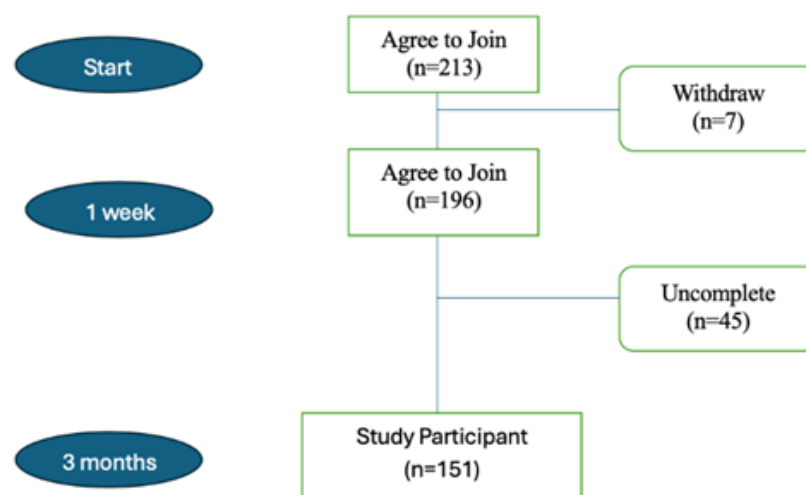


Fig. 2. Participant Engagement and Recruitment Flow

2.3. Measurement

Participants attended an initial baseline visit and received instructions for installing and using Srikandi Sehat. They were asked to record menstrual bleeding and related symptoms during the subsequent three menstrual cycles. After the observation period, participants completed electronic questionnaires via QR code and Google Forms. The questionnaires collected demographic information, menstrual knowledge, attitudes toward menstrual health and technology use, and perceived usability of the application.

Menstrual knowledge was assessed using a modified questionnaire based on menstrual health education content relevant to adolescents [3]. Attitude was assessed using an adapted technology and menstrual-health attitude questionnaire. Application usability was assessed using a modified version of the mHealth App Usability Questionnaire (MAUQ), which was adapted into 20 items and scored using a 4-point Likert scale ranging from 1 to 4 [14], following established principles for mHealth application usability evaluation [11]. The total usability score therefore ranged from 20 to 80 if item means were summed before transformation, or from 20 to 160 when the recoded scoring framework used in this manuscript was applied. Higher scores indicated more favorable perceived usability. Because the MAUQ was modified from its original format, the adaptation procedure, content review, pilot testing, and internal consistency should be reported. If available, Cronbach alpha values for the knowledge, attitude, and usability instruments should be inserted before final submission.

2.4. Data Testing and Analysis Methods

Quantitative data were analyzed using descriptive and correlation statistics. Participant characteristics and item responses were summarized using frequencies, percentages, means, standard deviations, medians, and interquartile ranges as appropriate. Normality was assessed using the Shapiro-Wilk test. Because knowledge and usability scores were not normally distributed, associations among knowledge, attitude, and usability were examined using Spearman rank correlation. The significance threshold was set at $p < 0.05$. Correlation coefficients were reported with approximate 95% confidence intervals. Missing questionnaire data and incomplete cycle records were handled through complete-case analysis for the final analytic dataset. Statistical software and package versions should be inserted by the authors before final submission.

2.5 Ethical considerations

The study received approval from the Research Ethics Committee of Universitas Harapan Bangsa, Indonesia (approval number No. B-LPPM-UHB/641/01/2025). Permission was obtained from relevant education authorities and school principals. Written informed consent was obtained from parents or guardians, and assent was obtained from participating adolescents. Participation was voluntary, and participants could withdraw at any time without academic or service-related consequences. Because the study involved minors and sensitive menstrual health data, each participant was assigned a unique study code. Identifying information was separated from questionnaire data. Application and questionnaire data were accessible only to the research team, stored in password-protected files, and reported only in aggregate form. Participants were informed that they could stop using the application and request withdrawal of their study data according to the approved ethics protocol. The shopping card incentive was provided after survey completion as compensation for time and participation and was not linked to specific responses.

3. RESULTS AND DISCUSSION

3.1 Results

A total of 151 adolescent girls were included in the final analysis. Most participants were aged 15-16 years ($n = 97$, 64.2%), followed by 13-14 years ($n = 34$, 22.5%) and 17-18 years ($n = 20$, 13.3%). Participants came from both rural areas ($n = 68$, 45.1%) and urban areas ($n = 83$, 54.9%). Regarding menstrual discomfort, 41 participants (27.0%) reported discomfort during menstruation, whereas 110 participants (73.0%) did not report discomfort. These characteristics indicate that the sample represented adolescent users from different age groups and residential settings.

Three constructs were assessed: menstrual knowledge, attitude, and usability. Knowledge scores had a mean of 13.10 (SD 1.69) on a 7-15 observed range, indicating generally high knowledge within this sample. Attitude scores had a mean of 29.80 (SD 3.89) on a 21-40 observed range, suggesting generally favorable attitudes. The modified usability score had a mean of 133.35 (SD 19.72) on an 80-160 observed range, indicating favorable perceived usability within the scoring approach used in this study. Normality testing showed that knowledge and usability were not normally distributed ($p < 0.001$), while attitude scores approached normal distribution ($p = 0.100$).

Item-level MAUQ responses indicated generally positive user perceptions. To avoid overinterpreting the findings, Table 3 now reports the two agreement categories and the residual non-agreement category derived from the available percentage data. Across items, most participants agreed or strongly agreed that the application helped them understand their menstrual cycle, provided understandable information, used comfortable visual elements, and was easy to navigate. These findings represent perceived usefulness and usability, not measured improvement in knowledge or self-management behavior.

Table 1. Participant Demographic Characteristics

Characteristic	Age Group	N=151
	13 – 14 yr	34 (22,5%)
	15 – 16 yr	97 (64,2%)
	17 – 18 yr	20 (13,3%)
Residence	Rural	68 (45,1%)
	Urban	83 (54,9%)
Menstrual discomfort	Yes	41 (27.0%)
	No	110 (73.0%)

Table 2. Descriptive Statistics of Knowledge, Attitude, and Usability Scores

	Knowledge	Attitude	Usability
Mean	13.10	29.80	133.35
SD	1.69	3.89	19.72
Minimum	7.00	21.00	80.00
25th percentile	12.00	27.00	120.00
Median	14.00	30.00	126.00
75th percentile	14.00	32.00	157.00
Maximum	15.00	40.00	160.00
Observed range	7-15	21-40	80-160
Shapiro-Wilk p-value	<0.001	0.100	<0.001



Fig. 3. Correlation Between Knowledge, Attitude, and Usability

Spearman correlation coefficients are reported in the text with approximate 95% confidence intervals and p-values because the distribution of knowledge and usability scores was non-normal. Spearman correlation analysis showed distinct relationships among the three constructs. Knowledge and attitude had a weak-to-moderate positive association ($\rho = 0.29$, 95% CI 0.14-0.43, $p < 0.001$). Knowledge and usability had a weaker positive association ($\rho = 0.21$, 95% CI 0.05-0.36, $p = 0.010$). Attitude and usability had the strongest association ($\rho = 0.53$, 95% CI 0.40-0.64, $p < 0.001$). These results suggest that more favorable attitudes were

associated with higher perceived usability. The findings do not establish causal influence because the analysis was correlational and did not include an experimental design.

Table 3. Item-Level Responses for the Modified MAUQ

No.	Item	Agree (3)	Strongly agree (4)	Non-agreement responses*
1	The application helps me understand my menstrual cycle.	46.35%	41.72%	11.93%
2	The information provided is easy to comprehend.	50.99%	43.05%	5.96%
3	The available features are appropriate for my needs.	54.97%	37.08%	7.95%
4	The application assists me in accurately recording and predicting my menstruation period.	49.00%	41.05%	9.95%
5	I feel that this application raises my awareness regarding reproductive and menstrual health.	48.34%	43.04%	8.62%
6	The application interface is appealing and easy to understand.	53.64%	37.75%	8.61%
7	The colors and icons used are comfortable to view.	56.29%	37.75%	5.96%
8	Navigation between menus is easy to perform.	59.60%	34.44%	5.96%
9	The text and symbols on the application are easy to read.	56.29%	38.41%	5.30%
10	The overall appearance of the application provides a positive impression.	56.29%	39.74%	3.97%
11	The information in the application is consistent with my knowledge of menstruation.	58.94%	36.42%	4.64%
12	The application provides explanations that align with real-life conditions.	60.26%	35.09%	4.65%
13	The application utilizes easily understandable terminology.	56.29%	39.73%	3.98%
14	The application provides useful education regarding reproductive health.	56.95%	39.74%	3.31%
15	The application content is appropriate for the user's age.	52.98%	41.10%	5.92%
16	I feel satisfied with the use of this application.	56.29%	39.07%	4.64%
17	I am willing to recommend this application to my friends.	56.29%	36.42%	7.29%
18	I feel that this application assists me in maintaining my reproductive health.	55.63%	39.07%	5.30%
19	This application is suitable for widespread use by young women.	51.65%	44.37%	3.98%
20	Overall, this application is beneficial for users.	51.66%	44.37%	3.97%

*Non-agreement responses combine the lower response categories available from the exported item-level data. The original raw dataset should be used to disaggregate these categories before final submission if available.

3.2 Discussion

This study evaluated the perceived usability and acceptability of Srikandi Sehat, a co-designed menstrual health application for Indonesian adolescent girls. The findings indicate favorable usability ratings and positive responses across navigation, readability, visual design, perceived usefulness, and age appropriateness. These results support the feasibility of adolescent-centered mobile health (mHealth) applications as a complementary source of menstrual health information. The findings should be interpreted as evidence of usability rather than application effectiveness because the study did not include a control group, validated pre- and post-intervention learning assessments, objective behavioral measures, or clinical outcomes. The stronger association between attitudes toward menstrual health and perceived usability, compared with the association between knowledge and perceived usability, suggests that adolescents with more positive attitudes toward menstrual health may perceive digital health applications more favorably. This observation is consistent with technology acceptance theories, which propose that perceived relevance and user attitudes influence the acceptance of digital health technologies [13]. The correlational design does not permit conclusions regarding causal relationships. The co-design approach may have contributed to positive user perceptions by aligning the application's language, visual design, and features with adolescent preferences. The inclusion of symptom tracking, a menstrual calendar, reminders, and educational content may increase the relevance of the application for school- and community-based menstrual health education, supporting broader sexual and reproductive health education

initiatives for adolescents [12]. Implementation within school health programs or nurse-led services requires additional evaluation. Several limitations should be considered. Usability and acceptability were assessed using self-reported questionnaires, which may be influenced by social desirability bias. The study did not include a comparison group or a pre- and post-intervention effectiveness evaluation; therefore, improvements in menstrual health literacy or self-management behaviors cannot be inferred. Participation required access to an Android smartphone, which may have introduced selection bias and limited the generalizability of the findings to adolescents with lower levels of digital access. Objective usage metrics, including login frequency, cycle-entry completion, feature-use duration, and responses to reminders, were not evaluated. The modified Mobile App Usability Questionnaire (MAUQ) also requires additional psychometric validation among Indonesian adolescent populations. Future research should include controlled study designs, longitudinal usage analytics, rural–urban subgroup analyses, psychometric validation of the adapted instruments, and evaluation of privacy perceptions among adolescent users.

4. CONCLUSION

This study found that Srikandi Sehat, a co-designed menstrual health application, was perceived as usable and acceptable by Indonesian adolescent girls who participated in the study. The modified usability score was favorable, with a mean of 133.35 out of 160 (SD = 19.72). Item-level responses also indicated positive perceptions of navigation, readability, age-appropriate content, visual design, and perceived usefulness. Attitudes toward menstrual health showed a stronger association with perceived usability than menstrual knowledge. These findings provide preliminary evidence that a locally adapted menstrual health application may be acceptable to adolescent users. The study did not evaluate clinical outcomes, objective behavioral change, educational effectiveness, or long-term application use. Future research should include psychometric validation of the adapted instruments, objective application usage analytics, controlled or quasi-experimental study designs, and implementation studies involving larger and more diverse adolescent populations.

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AI Tools Declaration

AI-based language editing assistance was used during revision to improve grammar, clarity, and academic coherence. The authors remain responsible for all scientific content, data interpretation, references, and final approval of the manuscript.

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