



A School-Based RISE Intervention to Improve Adolescent Reproductive Health Knowledge, Attitudes and Self-Reported Skills: A Quasi-Experimental Study

Nani Winani^{1,2}, Irna Nursanti^{1*}, Dhea Natasha¹, Rohman Azzam¹

¹Faculty of Nursing, Universitas Muhammadiyah Jakarta, Indonesia
Cempaka Putih Tengah I/I, Central Jakarta 10510, Indonesia

²Vocational High School, Bina Husada Mandiri, Bekasi, Indonesia
Jln.Wibawa Mukti II Gg.H.Tekel No.10 Jatiasih, Bekasi City, West Java 17425, Indonesia

Corresponding Author: Irna Nursanti | Email: irnanursanti@umj.ac.id | ORCID: 0000-0002-2021-0238

Corresponding author

Irna Nursanti

Faculty of Nursing,
Universitas
Muhammadiyah Jakarta,
Indonesia

Email:

irnanursanti@umj.ac.id

Received:

5 May 2026

Revised:

24 May 2026

Accepted:

22 July 2026

Keywords:

Adolescent reproductive
health, attitudes,
knowledge, RISE
intervention, self-reported
skills

DOI:

[http://dx.doi.
org/10.32419/jppni.
v11i2.904](http://dx.doi.org/10.32419/jppni.v11i2.904)

ABSTRACT

Objective

This study examined the effectiveness of the Reproductive Information for Healthy Empowerment (RISE) intervention in promoting improvements in reproductive health knowledge, attitudes, and self-reported skills among female adolescents.

Methods

A quasi-experimental pre-test–post-test control group study was conducted among 130 female students aged 15–19 years from a vocational health school in Indonesia. Participants were recruited using convenience sampling and allocated at the class level to an intervention group (n = 65) and a control group (n = 65). The RISE intervention was delivered over four weeks through structured modules combining video-based learning and interactive discussions. Data collection was conducted using a structured questionnaire assessing reproductive health knowledge, attitudes, and self-reported skills. Statistical analyses included paired and independent t-tests, followed by multivariable linear regression to adjust for potential confounders.

Results

The intervention group demonstrated significantly greater improvements in reproductive health knowledge (mean difference = 1.91, $p < 0.001$), attitudes (mean difference = 3.63, $p < 0.001$), and self-reported skills (mean difference = 1.15, $p = 0.003$) compared with the control group. Multivariable analysis confirmed that the RISE intervention remained significantly associated with improvements in all outcomes after adjustment for confounding variables.

Conclusion

The RISE intervention effectively improved adolescents' reproductive health knowledge, attitudes, and self-reported skills, supporting its integration into school-based reproductive health promotion programs.



This is an Open Access article published by PPNI, distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License

Background

Adolescent reproductive health remains a significant global public health concern because of its far-reaching consequences for maternal and child health, educational attainment, and the socio-economic well-being of young women (WHO, 2024; UNICEF, 2024). Despite ongoing preventive efforts, adolescent pregnancy continues to contribute substantially to the global burden of reproductive health problems. The Southeast Asia region accounts for a considerable proportion of adolescent births worldwide, indicating persistent challenges in preventing risky reproductive health behaviours among adolescents (UNICEF, 2024). These challenges suggest that existing prevention strategies have not fully addressed the factors influencing adolescent reproductive health outcomes (Rahmawati *et al.*, 2023; Sari & Wahyono, 2023).

In Indonesia, adolescent reproductive health problems are influenced by complex socio-cultural, educational, and informational factors (Rahmawati *et al.*, 2023; Wardiati *et al.*, 2023). National reports indicate that the prevalence of sexually transmitted infections (STIs) among individuals aged 15–24 years is approximately 15%, highlighting adolescents' vulnerability to reproductive health risks (Kementerian Kesehatan Republik Indonesia, 2022). Although the prevalence of child marriage has declined in recent years, concerns related to adolescent reproductive health remain substantial (Badan Pusat Statistik, 2017; UNICEF, 2024). Furthermore, limited access to accurate, comprehensive, and age-appropriate reproductive health information contributes to low health literacy among adolescents, which has been associated with unfavourable attitudes and increased engagement in risky sexual behaviours (Tesfaye & Agenagnew, 2020; Wardiati *et al.*, 2023).

Reproductive health education is recognized as an important promotive and preventive strategy for addressing these challenges. Adolescence is a critical developmental period characterized by increased curiosity, social influence, and vulnerability to health-risk behaviours, including unsafe sexual practices, unintended pregnancy, and sexually transmitted infections (WHO, 2024). Adolescents aged 15–19 years represent a period of late adolescence during which individuals experience increasing independence, social interaction, and exposure to reproductive health risks, making this age group an important target for reproductive health promotion programs (WHO, 2024). Previous studies have demonstrated that reproductive health education can improve adolescents' knowledge and foster more positive attitudes toward reproductive health (Auri, Jusuf, & Ahmad, 2022). However, improving knowledge alone may not be sufficient to achieve meaningful changes in attitudes and skills necessary for healthy decision-making among adolescents (Adnin, Intan, & Julia, 2024). Sustainable behaviour change requires individuals to possess adequate knowledge, develop positive attitudes, and apply these competencies in real-life situations (Adnin, Intan & Julia 2024).

Previous studies in Indonesia have reported that school-based reproductive health education programs primarily emphasize cognitive learning outcomes, whereas the integration of affective and behavioral learning components remains limited (Pinandari *et al.*, 2023; Wardiati *et al.*,

2023). Most studies have focused on reproductive health knowledge, attitudes, literacy, and risk behaviors among adolescents in general educational settings (Rahmawati *et al.*, 2023; Sari & Wahyono, 2023). However, evidence regarding reproductive health interventions among students enrolled in health-focused vocational high schools remains scarce. Although these students may have greater exposure to health-related information through their educational curriculum, studies simultaneously evaluating reproductive health knowledge, attitudes, and self-reported skills in this population are limited. Existing evidence further suggests that knowledge alone is insufficient to influence attitudes and behavioral competencies without structured and participatory educational approaches (Hagger *et al.*, 2022; Rahmadyanti *et al.*, 2025).

As future healthcare professionals, vocational health students require not only adequate reproductive health knowledge but also positive attitudes and practical competencies to support informed decision-making and healthy behaviours. Moreover, little is known about the effectiveness of comprehensive reproductive health interventions within the local educational context of Bekasi, Indonesia. Bekasi, which forms part of the rapidly urbanizing metropolitan area surrounding Jakarta, has experienced substantial population growth and urban development in recent years, making it representative of an urban adolescent population in Indonesia (Katherina, 2023). Despite improved access to education, adolescents in Bekasi continue to face reproductive health challenges, underscoring the need for structured school-based reproductive health promotion (Oktaviani *et al.*, 2024). These knowledge gaps highlight the need for a structured, theory-informed intervention that simultaneously addresses the cognitive, affective, and behavioral domains of learning to improve adolescent reproductive health outcomes.

To address this gap, the Reproductive Information for Healthy Empowerment (RISE) intervention was developed as a structured educational approach integrating cognitive, affective, and behavioural components within a participatory learning framework (Anisah, 2020; Setyowati, Sofiyanti, & Widyawati, 2022). The intervention is conceptually informed by health behaviour theories emphasizing that knowledge acquisition alone is insufficient to produce meaningful changes in health-related behaviours (Hagger *et al.*, 2022; Curran, Matthews & O'Donoghue, 2025). Unlike conventional reproductive health education programs that primarily focus on information delivery, RISE incorporates interactive learning strategies, including video-based education, guided discussions, reflective exercises, role-playing, and commitment-building activities. These strategies are intended to enhance engagement, encourage critical reflection, strengthen positive attitudes, and support the development of reproductive health decision-making skills (Kustin & Handayani, 2024). Therefore, this study aimed to determine the effectiveness of the Reproductive Information for Healthy Empowerment (RISE) intervention in improving reproductive health knowledge, attitudes, and self-reported skills among female adolescents enrolled in a health-focused vocational high school in Bekasi, Indonesia.

Methods

This study employed a quasi-experimental pretest–posttest control group design and was conducted in 2025 at a health-focused vocational high school in Bekasi, Indonesia. Given the educational setting, participants were assigned at the class level to maintain the natural learning environment. Both the intervention and control groups were recruited from the same health-focused vocational high school but from different classes. Two classes with comparable educational characteristics were selected, with one class assigned to the intervention group and the other to the control group. To minimize contamination between groups, intervention activities were conducted separately, participants remained in their respective classes throughout the study period, and standardized procedures were applied during data collection.

The study population consisted of female students aged 15–19 years enrolled in a health-focused vocational high school in Bekasi, Indonesia. Participants were recruited using a convenience

sampling approach based on availability and eligibility criteria, including being enrolled in the selected school, willing to participate, and willing to attend all intervention sessions. A total of 133 students were assessed for eligibility. Three participants were lost to follow-up because they were absent during the posttest assessment. Sample size was determined using G Power version 3.1.9.7 (Heinrich Heine University Düsseldorf, Düsseldorf, Germany) for comparing two independent means in a quasi-experimental design, assuming a two-sided significance level (α) of 0.05, a statistical power of 0.80, and an effect size (Cohen's d) of 0.60 (Faul *et al.*, 2009). Because previous studies reporting effect sizes for reproductive health knowledge, attitudes, and self-reported skills simultaneously were unavailable, the sample size calculation was based on the primary outcome of reproductive health knowledge. The calculation indicated a minimum requirement of 51 participants per group. To account for potential attrition, an additional allowance of approximately 20–30% was added, resulting in a target sample size of 65 participants per group. Consequently, 130 participants completed both pre-test and post-test assessments and were included in the final analysis, with 65 participants allocated to the intervention group and 65 participants allocated to the control group (Figure 1). Inclusion criteria were: (1) female students aged 15–19 years; (2) currently enrolled in the selected school; (3) willing to participate and provide informed consent; and (4) willing to attend all intervention sessions. Exclusion criteria included students who had participated in similar reproductive health programs, were absent during baseline assessment, or were unable to complete the intervention sessions.

Data were collected using a structured questionnaire consisting of three domains: reproductive health knowledge, attitudes, and self-reported skills. Participant characteristics collected in this study included age, religion, parental education, living status, previous reproductive health education, and access to reproductive health information. Parental education was categorized into two levels based on the highest level of formal education completed: low education (elementary school, junior high school, and senior high school) and high education (diploma, undergraduate, and postgraduate education).

The questionnaire consisted of 31 items distributed across the three domains: knowledge (10 items), attitudes (11 items), and self-reported skills (10 items). The instrument was adapted from previously validated questionnaires assessing adolescent reproductive health knowledge, attitudes, and practices (Adjie, Kurniawan & Surya, 2022; Kustin & Handayani, 2024) and was further refined to align with the objectives of the present study. The adaptation process involved reviewing relevant instruments, selecting items consistent with the study objectives, modifying item wording to suit the local context, and refining the questionnaire for vocational health students while maintaining the original constructs. Several items were linguistically adapted and contextualized to reflect the characteristics, educational background, and learning environment of vocational health students while preserving their original conceptual meaning. The questionnaire domains were constructed to reflect the cognitive (knowledge), affective (attitudes), and behavioural (self-reported skills) components of health promotion and adolescent health behaviour theories (Cheek *et al.*, 2015).

Content validity was evaluated by three experts comprising one expert in adolescent reproductive health, one expert in maternal nursing, and one expert in nursing education using the Item-Level Content Validity Index (I-CVI). Based on the experts' feedback, minor revisions were made to improve the wording, clarity, and contextual relevance of several items prior to questionnaire administration. The adapted questionnaire subsequently underwent pilot testing among 30 adolescents with characteristics similar to those of the study population from a comparable vocational health school. The questionnaire demonstrated acceptable psychometric properties during preliminary testing, with I-CVI values ranging from 0.83 to 1.00, item validity coefficients exceeding the predetermined criterion ($r > 0.306$), and Cronbach's α coefficients ranging from 0.796 to 0.975 across the three domains, supporting its use in the main study.

The knowledge domain comprised 10 multiple-choice items assessing participants' understanding of reproductive anatomy, puberty, menstrual health, sexually transmitted infections, and reproductive health prevention strategies (Adjie, Kurniawan & Surya, 2022). Each correct response was assigned a score of 1 and incorrect responses were scored 0, resulting in a total score ranging from 0 to 10, with higher scores indicating better reproductive health knowledge. The attitude domain consisted of 11 items assessing participants' perceptions, beliefs, and attitudes toward reproductive health (Adjie, Kurniawan & Surya, 2022). Responses were measured using a four-point Likert scale ranging from strongly disagree (1) to strongly agree (4), yielding total scores ranging from 11 to 44. Higher scores indicated more positive attitudes toward reproductive health. The self-reported skills domain comprised 10 items assessing adolescents' self-reported ability to make informed reproductive health decisions, resist negative peer influences, seek reliable reproductive health information, communicate health concerns appropriately, and engage in preventive reproductive health practices (Kustin & Handayani, 2024). Responses were recorded using a binary format ("Yes" = 1 and "No" = 0), resulting in total scores ranging from 0 to 10, with higher scores indicating greater self-reported reproductive health skills.

The Reproductive Information for Healthy Empowerment (RISE) intervention was implemented over four consecutive weeks through four structured educational modules integrating cognitive, affective, and behavioural learning components (Table 1). The intervention was developed based on adolescent reproductive health education frameworks and guided conceptually by the Health Promotion Model and the Theory of Planned Behaviour (Purwatyningsih & Nursanti, 2024). The first session focused on basic reproductive health concepts, including reproductive anatomy, puberty, menstrual health, and personal hygiene. The second session addressed digital literacy and risk prevention, including identification of reliable health information, reproductive health myths and facts, and prevention of sexually transmitted infections and unintended pregnancy. The third session emphasized emotional regulation and decision-making skills through guided reflection, problem-solving activities, and role-play exercises designed to strengthen self-efficacy and perceived behavioural control. The final session focused on behavioural reflection, goal setting, and personal commitment planning to reinforce healthy behavioural intentions.

The intervention incorporated video-based learning, guided discussion, case-based learning, role-playing, reflective exercises, and action planning. The educational videos were developed by the researchers based on the RISE modules and were designed to support the learning objectives of each session. Each video had a duration of approximately 3–5 minutes and was delivered together with presentation-based educational materials to facilitate participant engagement and understanding. These strategies were designed to enhance knowledge, foster positive attitudes, strengthen self-reported skills, and support behavioural intentions related to healthy reproductive practices. Content validity of the intervention modules was assessed by three experts in maternal and reproductive health nursing and nursing education. Minor revisions were made based on expert feedback before implementation.

Each session lasted approximately 60–90 minutes and was delivered during regular class hours by the principal investigator using standardized instructional materials and implementation guidelines to ensure intervention fidelity. The intervention was conducted over four consecutive weeks, with one module delivered each week on Thursday. Pretest assessments were conducted one week before the intervention, while post-test assessments were conducted one week after completion of the final intervention session. Attendance was monitored throughout the intervention period. Participants in the control group continued to receive routine instruction according to the existing school curriculum and did not participate in any RISE-related educational activities during the study period.

Data collection was conducted in two phases. At baseline, participants completed the pretest questionnaire after receiving information about the study and providing informed consent. The intervention group subsequently participated in the four-week RISE program, whereas the control group continued to receive routine instruction according to the existing school curriculum without exposure to any RISE-related educational activities. To minimize contamination between groups, the intervention and control groups were assigned to separate classes, RISE sessions were delivered exclusively to the intervention group by the research team outside the routine curriculum, and intervention materials were not distributed to the control group during the study period. Teachers responsible for the control group continued their usual instructional activities and were not involved in delivering the RISE program. The control group was offered access to the RISE educational materials after completion of data collection. Posttest assessments were administered to both groups one week after completion of the intervention.

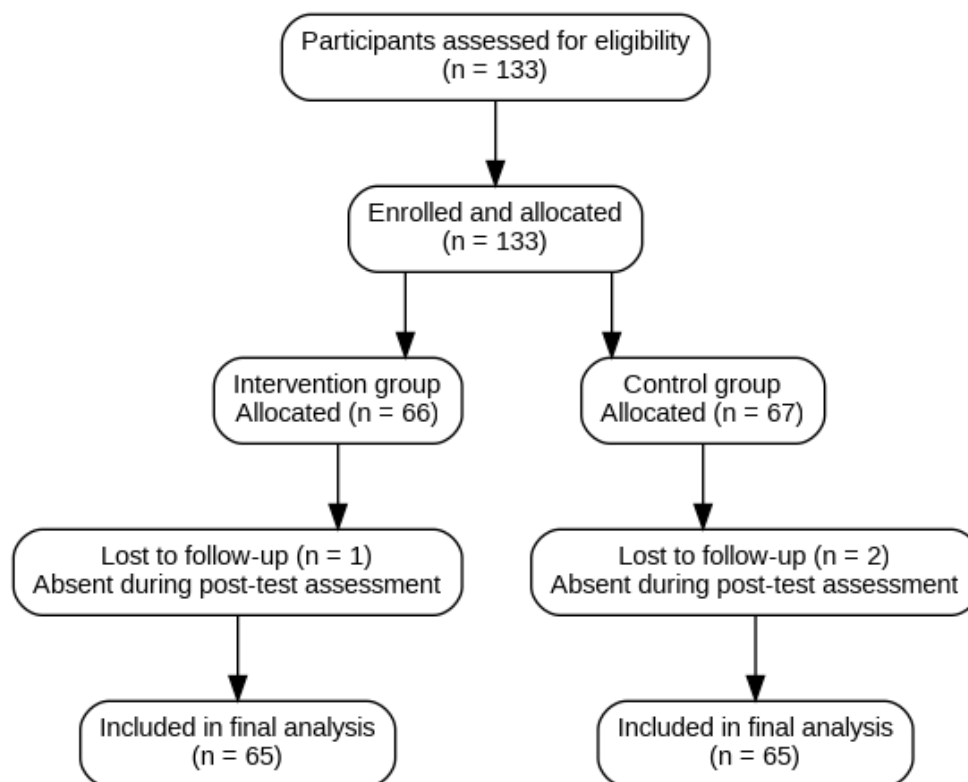


Figure 1. Participant flow diagram

Data were analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., 2019, Armonk, NY, USA). Descriptive statistics were used to summarize participant characteristics and study variables. Prior to inferential analyses, assumptions for parametric testing were evaluated using the Shapiro–Wilk test for normality and Levene’s test for homogeneity of variance. Paired t-tests were used to assess within-group differences between pre-test and post-test scores. Independent t-tests were performed to compare mean changes between intervention and control groups. To identify factors associated with changes in reproductive health knowledge, attitudes, and self-reported skills, separate multiple linear regression analyses were conducted. Independent variables included age, parental education, living status, previous reproductive health education, access to information, and religion. Variables with p-values < 0.25 in bivariate analyses were entered into the regression models. Assumptions of residual normality and absence of multicollinearity were assessed before model interpretation. Age was subsequently included as a covariate in multivariable analyses to control for its potential confounding effect. Because individual randomization and

blinding were not feasible, standardized intervention procedures and instructional materials were used to enhance consistency and internal validity. Statistical significance was established at $p < 0.05$. Effect sizes (Cohen's d) were calculated to estimate the magnitude of intervention effects and interpreted as small (0.20), moderate (0.50), and large (≥ 0.80).

This study received ethical approval from the Health Research Ethics Committee of the Faculty of Nursing, Universitas Muhammadiyah Jakarta (No. 1355/F.9-UMJ/IX/2025). All participants received information regarding the study objectives and procedures before participation. Written informed consent was obtained from all participants. For participants younger than 18 years, written informed consent was obtained from their parents or legal guardians prior to data collection. Information sheets and consent forms describing the study objectives, procedures, potential risks and benefits, confidentiality, and the voluntary nature of participation were distributed through the school to parents or guardians. Only students who returned signed parental or guardian consent forms and provided their own written assent were enrolled in the study, in accordance with the approved ethical protocol. Participants provided assent and were informed of their right to withdraw from the study at any time without penalty.

Table 1. Structure, Objectives, and Content of the RISE Intervention

Week	Module Topic	Learning Objectives	Content Focus	Learning Methods	Expected Outcomes
Week 1, (Thursday, 1:00 - 2:30 PM).	Basic Reproductive Health	Students are able to explain reproductive anatomy, puberty changes, and personal hygiene practices	Reproductive system, puberty, menstrual health, hygiene	Video-based learning, guided discussion, Q&A	Improved foundational knowledge
Week 2 (Thursday, 1:00 - 2:30 PM)	Digital Literacy and Risk Prevention	Students are able to identify reliable health information and recognize risky behaviors	Online information sources, myths vs facts, STI and pregnancy prevention	Case-based learning, group discussion	Increased critical thinking and awareness
Week 3 (Thursday, 1:00 - 2:30 PM)	Stress Management and Decision- Making	Students are able to demonstrate decision-making and emotional regulation self-reported skills	Peer pressure, emotional control, assertive communication	Role-play, reflective discussion	Improved self-efficacy and decision-making self-reported skills
Week 4 (Thursday, 1:00 - 2:30 PM)	Reflection and Behavioral Commitment	Students are able to formulate personal commitments toward healthy behavior	Behavior reflection, goal setting, personal commitment	Reflection session, action planning	Strengthened behavioral intention

Note: Each session was conducted once per week over four consecutive weeks, with a duration of approximately 60–90 minutes per session. The intervention was delivered within the regular class schedule by trained nursing educators using standardized instructional materials to ensure consistency across sessions

Results

A total of 130 participants completed the study and were included in the final analysis, with 65 participants assigned to the intervention group and 65 participants assigned to the control group. Baseline participant characteristics are presented in Table 2. Baseline characteristics were compared between groups to assess their comparability prior to the intervention. Although the mean age differed significantly between groups, with participants in the intervention group being younger than those in the control group (16.23 ± 0.55 years vs. 17.03 ± 0.43 years, $p < 0.001$), all participants were within the adolescent age range (15–19 years) and were enrolled in the same educational setting. No statistically significant differences were observed in religion, parental education, living status, previous reproductive health education, or access to reproductive health information ($p > 0.05$), indicating that the groups were generally comparable with respect to these characteristics.

Baseline comparisons of reproductive health knowledge, attitudes, and self-reported skills are presented in Table 3. No statistically significant differences were observed between the intervention and control groups for knowledge ($p = 0.307$), attitudes ($p = 0.543$), or self-reported skills ($p = 0.965$), indicating comparable baseline outcome levels prior to implementation of the intervention.

Table 2. Baseline Characteristics of Participants by Group (n=130)

Variable	Category	Intervention (n= 65)	Control (n= 65)	Total (n= 130)	Statistic	p-value
Age (years)	Mean $\pm$ SD	16.23 ± 0.55	17.03 ± 0.43	—	$t = -9.20$	<0.001
Religion	Non-Islam	0 (0.0%)	3 (100.0%)	3 (2.3%)	Fisher's Exact	0.080
	Islam	65 (51.2%)	62 (48.8%)	127 (97.7%)		
Father's Education	Low	51 (51.0%)	49 (49.0%)	100 (76.9%)	$\chi^2 = 0.17$	0.677
	High	14 (46.7%)	16 (53.3%)	30 (23.1%)		
Mother's Education	Low	49 (51.6%)	46 (48.4%)	95 (73.1%)	$\chi^2 = 0.35$	0.553
	High	16 (45.7%)	19 (54.3%)	35 (26.9%)		
Living Status	Parents	62 (49.2%)	64 (50.8%)	126 (96.9%)	$\chi^2 = 1.03$	0.310
	Guardian	3 (75.0%)	1 (25.0%)	4 (3.1%)		
Previous Reproductive health Education	No	5 (71.4%)	2 (28.6%)	7 (5.4%)	$\chi^2 = 1.36$	0.244
	Yes	60 (48.8%)	63 (51.2%)	123 (94.6%)		
Reproductive health Information Access	Low	23 (54.8%)	19 (45.2%)	42 (32.3%)	$\chi^2 = 0.56$	0.453
	Adequate	42 (47.7%)	46 (52.3%)	88 (67.7%)		

Note: Values are presented as frequency (%) or mean $\pm$ standard deviation (SD). Independent t-tests were used for continuous variables and chi-square tests for categorical variables. Fisher's Exact Test was used when expected cell counts were less than five

Table 3. Baseline Comparison of Outcome Variables Between Groups

Variable	n	Intervention Pre-test Mean $\pm$ SD	Control Pre-test Mean $\pm$ SD	t-Value	p-Value
Knowledge	130	5.09 $\pm$ 2.16	5.49 $\pm$ 1.84	-1.03	0.307
Attitudes	130	30.46 $\pm$ 2.66	30.74 $\pm$ 2.64	-0.61	0.543
Self-Reported skills	130	17.63 $\pm$ 2.44	17.65 $\pm$ 2.43	-0.04	0.965

Note: Independent *t*-tests were used to compare baseline outcome variables between groups. No statistically significant differences were observed at baseline.

Table 4. Mean Scores of Knowledge, Attitudes, and Self-Reported skills Before and After the Intervention

Variable	n	Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Change
Knowledge	65	Intervention	5.09 $\pm$ 2.16	7.37 $\pm$ 2.28	+2.28
	65	Control	5.49 $\pm$ 1.84	5.86 $\pm$ 1.85	+0.37
Attitudes	65	Intervention	30.46 $\pm$ 2.66	35.05 $\pm$ 3.81	+4.59
	65	Control	30.74 $\pm$ 2.64	31.69 $\pm$ 2.25	+0.95
Self-Reported skills	65	Intervention	17.63 $\pm$ 2.44	19.25 $\pm$ 1.26	+1.62
	65	Control	17.65 $\pm$ 2.43	18.11 $\pm$ 2.45	+0.46

Notes: Values are presented as mean $\pm$ standard deviation (SD). Mean change represents the difference between posttest and pretest scores within each group.

Changes in reproductive health knowledge, attitudes, and self-reported skills before and after the intervention are presented in Table 4. Participants in the intervention group demonstrated greater improvements across all outcome variables compared with those in the control group. The largest improvement in the intervention group was observed in attitudes, with mean scores increasing from 30.46 $\pm$ 2.66 at baseline to 35.05 $\pm$ 3.81 after the intervention (mean change = +4.59). Knowledge scores increased from 5.09 $\pm$ 2.16 to 7.37 $\pm$ 2.28 (mean change = +2.28), while self-reported skills increased from 17.63 $\pm$ 2.44 to 19.25 $\pm$ 1.26 (mean change = +1.62). In contrast, the control group showed only modest improvements during the study period. Knowledge scores increased by 0.37 points, attitudes increased by 0.95 points, and self-reported skills increased by 0.46 points.

Within-group and between-group comparisons are presented in Table 5. In the intervention group, statistically significant improvements were observed in knowledge ($t = -7.26$, $p < 0.001$), attitudes ($t = -7.94$, $p < 0.001$), and self-reported skills ($t = -5.48$, $p < 0.001$). The magnitude of improvement was greatest for attitudes (Cohen's $d = 0.99$), followed by knowledge (Cohen's $d = 0.90$) and self-reported skills (Cohen's $d = 0.68$). In the control group, attitudes increased significantly over time ($t = -3.05$, $p = 0.003$), whereas changes in knowledge ($p = 0.113$) and self-reported skills ($p = 0.067$) were not statistically significant. Comparison of mean changes between groups demonstrated significantly greater improvements among participants receiving the RISE intervention than among those in the control group. The intervention group achieved greater gains in knowledge (mean difference = 1.91, $p < 0.001$), attitudes (mean difference = 3.63, $p < 0.001$), and self-reported skills (mean difference = 1.15, $p = 0.003$). These findings support the effectiveness of the RISE intervention in improving adolescent reproductive health outcomes.

Table 5. Within-Group and Between-Group Differences in Knowledge, Attitudes, and Self-Reported Skills

Variable	Group	Mean Change	T	p-value	Cohen's (d)
Knowledge	Intervention (Pre vs Post)	+2.28	-7.26	<0.001	0.90
	Control (Pre vs Post)	+0.37	-1.61	0.113	0.20
	Between group Difference	+1.91	4.61	<0.001	0.86
Attitudes	Intervention (Pre vs Post)	+4.59	-7.94	<0.001	0.99
	Control (Pre vs Post)	+0.95	-3.05	0.003	0.38
	Between group Difference	+3.63	5.20	<0.001	0.97
Self- Reported skills	Intervention (Pre vs Post)	+1.62	-5.48	<0.001	0.68
	Control (Pre vs Post)	+0.46	1.86	0.067	0.23
	Between group Difference	+1.15	2.99	0.003	0.53

Note: Within-group comparisons were analyzed using paired t-tests. Between-group comparisons were analyzed using independent t-tests comparing mean changes between groups. Cohen's d values of 0.20, 0.50, and ≥ 0.80 indicate small, moderate, and large effects, respectively.

Multiple linear regression analyses were conducted to examine demographic factors associated with changes in reproductive health knowledge, attitudes, and self-reported skills (Table 6). Age was significantly associated with changes in all three outcomes. Increasing age was associated with smaller improvements in knowledge ($B = -0.861$, $p = 0.013$), attitudes ($B = -1.559$, $p = 0.007$), and self-reported skills ($B = -0.928$, $p = 0.003$), suggesting that younger participants experienced greater improvements following the intervention. Parental education demonstrated significant associations with changes in attitudes. Higher maternal education was associated with greater improvements in attitudes ($B = 2.181$, $p = 0.017$), whereas father's education showed a negative association with attitude change ($B = -2.069$, $p = 0.028$). The association between father's education and self-reported skills was of borderline statistical significance ($B = -1.003$, $p = 0.050$) and should therefore be interpreted with caution. Living status, previous reproductive health education, access to reproductive health information, and religion were not significantly associated with changes in knowledge, attitudes, or self-reported skills ($p > 0.05$). Overall, these

Table 6. Multivariate Linear Regression Analysis of Factors Associated with Changes in Knowledge, Attitudes, and Self-Reported Skills

Variables	n	Knowledge (B)	p-value	Attitudes (B)	p-value	Self-reported skills (B)	p-value
Age	130	-0.861	0.013*	-1.559	0.007*	-0.928	0.003*
Father's Education	130	-0.088	0.875	-2.069	0.028*	-1.003	0.050*
Mother's Education	130	0.137	0.800	2.181	0.017*	-0.084	0.864
Living Status	130	0.490	0.698	1.629	0.439	-1.248	0.275
Previous Education	130	0.055	0.954	-1.663	0.300	-0.903	0.299
Information Access	130	0.174	0.703	0.661	0.386	-0.145	0.725
Religion	130	0.703	0.622	0.671	0.778	0.802	0.534

B = unstandardized regression coefficient

* $p < 0.05$ indicates statistical significance

Note: Multiple linear regression analyses were conducted to explore demographic factors associated with changes in reproductive health knowledge, attitudes, and self-reported skills. All models were adjusted for age, parental education, living status, previous reproductive health education, information access, and religion.

findings suggest that demographic characteristics, particularly age and parental educational background, may contribute to variations in adolescents' responses to reproductive health education interventions.

Discussion

The findings of this study suggest that the Reproductive Information for Healthy Empowerment (RISE) intervention was associated with improvements in adolescents' reproductive health knowledge, attitudes, and self-reported skills. Participants who received the four-session RISE intervention delivered over four consecutive weeks demonstrated greater improvements across all outcomes than those receiving routine school instruction, indicating that a structured and participatory educational approach may enhance reproductive health learning among adolescents. The present findings align with previous studies showing that reproductive health education is more effective when it incorporates multiple domains of learning rather than focusing exclusively on knowledge acquisition (Bourke, Cullen & Maunsell, 2025; Choi *et al.*, 2025). The World Health Organization similarly emphasizes that adolescent reproductive health is influenced not only by access to information but also by social, cognitive, and contextual factors that shape health-related decision-making (WHO, 2024).

One possible explanation for the observed improvements is the participatory and multimodal design of the RISE intervention. The combination of video-based learning, guided discussions, case-based scenarios, role-playing, and reflective exercises may have facilitated active engagement and enabled participants to connect reproductive health information with situations encountered in everyday life. Interactive learning approaches encourage adolescents to process information more deeply, exchange perspectives with peers, and develop confidence in applying health-related knowledge to decision-making processes. These mechanisms are consistent with evidence indicating that learner-centred educational strategies enhance engagement, knowledge retention, and behavioural readiness among adolescents (Rahmadyanti *et al.*, 2025; Chan *et al.*, 2021).

The largest improvement was observed in attitudes, suggesting that the intervention may have been particularly effective in influencing participants' perceptions, beliefs, and evaluations related to reproductive health. This finding is consistent with the Health Promotion Model and the Theory of Planned Behaviour, which propose that cognitive understanding alone is insufficient to influence health-related outcomes and that affective and motivational factors play an important role in shaping intentions and future behaviours (Hagger *et al.*, 2022; Purwatyningsih & Nursanti, 2024). Previous studies have similarly reported that educational interventions incorporating interactive learning strategies, discussion, reflection, and participant engagement are more likely to improve adolescents' attitudes toward health-related issues than information-based approaches alone (Bourke, Cullen & Maunsell, 2025). The emphasis on reflection, discussion, and peer interaction within the RISE intervention may therefore have contributed to positive changes in attitudes by encouraging participants to critically evaluate existing beliefs and social influences related to reproductive health.

Although significant improvements were also observed in self-reported skills, the magnitude of change was smaller than that observed for attitudes and knowledge. This finding may reflect the complexity of translating newly acquired knowledge and positive attitudes into behavioural competencies. Skills related to decision-making, communication, and preventive practices often require repeated opportunities for practice, reinforcement, and real-world application before meaningful changes can be fully realized. Previous research suggests that sustained engagement and intervention periods extending beyond several weeks are often necessary to support the development of health-related competencies and behavioural maintenance (Curran, Matthews & O'Donoghue, 2025). Therefore, while the intervention was associated with improvements in self-

reported skills, future longitudinal research is needed to determine whether these improvements can be maintained over time and translated into sustained behavioural change.

The multivariable analysis indicated that younger participants demonstrated greater improvements in knowledge, attitudes, and self-reported skills than older participants. One possible explanation is that younger adolescents may be more receptive to new information and educational experiences, whereas older adolescents may have more established beliefs, attitudes, and behavioural patterns that are less responsive to short-term educational interventions (WHO, 2024; Bourke, Cullen & Maunsell, 2025). These findings highlight the potential value of introducing reproductive health education early in adolescence to maximize opportunities for learning and behaviour formation (WHO, 2024). Parental educational background was associated with changes in attitudes, although the direction and magnitude of these associations differed between maternal and paternal education. These findings suggest that family context may influence adolescents' receptiveness to reproductive health education, possibly through differences in communication patterns, educational support, and access to health information (Rahmawati *et al.*, 2023; Wardiati *et al.*, 2023). However, these associations should be interpreted cautiously because parental education was not consistently related to all study outcomes.

Alternative explanations for the observed improvements should also be considered. Changes in outcomes may have been influenced by repeated exposure to the measurement instruments, increased attention received during intervention activities, or natural developmental changes occurring during adolescence (Curran, Matthews & O'Donoghue, 2025). Although the inclusion of a comparison group helps reduce these threats to internal validity, such influences cannot be completely excluded in a quasi-experimental design. Furthermore, a significant baseline difference in age was observed between groups. Although age was included in the multivariable analysis to account for its potential influence, statistical adjustment may not fully eliminate the effects of non-random baseline differences, particularly because developmental maturity, peer influences, and prior experiences were not directly measured (Hagger *et al.*, 2022). Consequently, the results should be interpreted cautiously.

From an implementation perspective, these findings highlight the important role of nurses in delivering school-based health promotion interventions. Nurses are uniquely positioned to integrate educational, preventive, and behavioural approaches within school settings and to support adolescents in developing the knowledge, attitudes, and competencies necessary for informed reproductive health decision-making (Saquing *et al.*, 2025; WHO, 2021). The RISE model may therefore represent a promising framework for school-based reproductive health promotion. Future research should evaluate its feasibility, acceptability, and sustainability across diverse educational contexts and populations.

Several limitations should be acknowledged. The quasi-experimental design, which did not include individual randomization, may have resulted in selection bias. Additionally, the single-school setting may restrict the generalizability of the results. Although participants were allocated to different classes and intervention activities were conducted separately to minimize contamination, both groups were recruited from the same school. Therefore, informal communication and information sharing between participants outside the classroom could not be completely prevented, potentially influencing the observed intervention effects. The relatively short intervention period and immediate post-intervention assessment did not allow evaluation of the long-term sustainability of the intervention effects. In addition, collecting data through participant self-report may have introduced response bias due to a tendency to present oneself in a favorable manner, particularly given the sensitive nature of reproductive health topics (Pham, Goto, & Kakinaka, 2025). Future studies should consider randomized controlled designs, recruitment from multiple schools or cluster randomization to further reduce contamination bias, longer follow-up periods, objective

behavioral outcome measures, and broader populations to increase the validity, sustainability, and generalizability of the findings.

Conclusion

The RISE intervention was associated with significant improvements in reproductive health knowledge, attitudes, and self-reported skills among female adolescents. These findings suggest that integrating cognitive, affective, and behavioural learning components within structured school-based educational programs may enhance adolescents' reproductive health competencies and support informed reproductive health decision-making. The findings also highlight the important role of nurses in delivering theory-informed school-based health promotion interventions. As a structured and participatory educational approach, the RISE model may serve as a practical framework for reproductive health promotion in educational settings. Future studies should evaluate the long-term sustainability of intervention effects, incorporate objective behavioural outcome measures, and examine implementation across diverse populations and school contexts.

References

- Adjie, J.S., Kurniawan, A.P., & Surya, R. (2022). Knowledge, attitude, and practice towards reproductive health issue of adolescents in rural area, Indonesia: A cross-sectional study. *The Open Public Health Journal*, 15(1), 1-7. <http://dx.doi.org/10.2174/18749445-v15-e2206275>
- Adnin, W., & Intan, Z. (2024). Hubungan tingkat pengetahuan kesehatan reproduksi remaja dengan sikap seksual pranikah di SMA KP 3 Paseh Kabupaten Bandung. *Jurnal Kesehatan*, 13(1), 110-121. <https://doi.org/10.37048/kesehatan.v13i1.395>
- Anisah, S. (2020). Program pelayanan kesehatan peduli remaja di puskesmas. *HIGEIA (Journal of Public Health Research and Development)*, 4(Special 4), 846-854. <https://doi.org/10.15294/higeia.v4iSpecial.4.37007>
- Auri, K., Jusuf, E.C., & Ahmad, M. (2022). Strategi layanan kesehatan reproduksi pada remaja: literature review. *Faletehan Health Journal*, 9(01), 20–36. <https://doi.org/10.33746/Fhj.V9i01.325>
- Badan Pusat Statistik. (2017). *Statistik Indonesia 2017*. Retrieved from <https://www.bps.go.id/id/publication/2017/08/02/a89a2789e9ff45b2bc4e4cb5/child-marriage-in-indonesia-2013-and-2015.html>
- Bourke, A., Cullen, C., & Maunsell, C. (2025). Preparing to teach relationships and sexuality education: student teachers' perceived knowledge and attitudes. *Sex Education*, 25(3), 341–358. <https://doi.org/10.1080/14681811.2024.2337860>
- Chan, H.H.-K., Kwong, H.Y.C., Shu, G.L.F., Ting, C.Y., & Lai, F.H.-Y. (2021). Effects of experiential learning programmes on adolescent prosocial behaviour, empathy, and subjective well-being: A systematic review and meta-analysis. *Frontiers in Psychology*, 12, 709699. <https://doi.org/10.3389/fpsyg.2021.709699>
- Cheek, C., Fleming, T., Lucassen, M.F., Bridgman, H., Stasiak, K., Shepherd, M., & Orpin, P. (2015). Integrating health behavior theory and design elements in serious games. *Jmir Mental Health*, 2(2), E11. <https://doi.org/10.2196/Mental.4133>
- Choi, Y.M., Noh, S., Seo, H.-J., & Yoon, J. (2025). School nurse-led educational interventions for sexual and reproductive health promotion in adolescents in high-income countries: A mixed-methods systematic review protocol. *Bmj Open*, 15(2), E087528. <https://doi.org/10.1136/Bmjopen-2024-087528>
- Curran, D.F., Matthews, J., & O'Donoghue, G. (2025). Developing theory and evidence based intervention content using the behaviour change wheel, theoretical domains framework, and the person-based approach: A worked example for an intervention targeting sedentary

- behaviour with people living with obesity. *Plos One*, 20(12), E0338196. <https://doi.org/10.1371/Journal.Pone.0338196>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*, 41(4), 1149-1160.
- Hagger, M.S., Cheung, M.W.-L., Ajzen, I., & Hamilton, K. (2022). Perceived behavioral control moderating effects in the theory of planned behavior: A meta-analysis. *Health Psychology*, 41(2), 155–167. <https://doi.org/10.1037/Hea0001153>
- Katherina, L.K. (2023). Rural-to-urban reclassification and its impact on urbanization in Indonesia: A case study of West Java Province. *IOP Conference Series: Earth and Environmental Science*, 1263(1), 012015. <https://doi.org/10.1088/1755-1315/1263/1/012015>
- Kementerian Kesehatan Republik Indonesia. (2022). *Profil kesehatan Indonesia tahun 2022*. Retrieved from <https://kemkes.go.id/id/indonesia-health-profile-2022>
- Kustin, K., & Handayani, Y. (2024). Konseling teman tentang keterampilan reproduksi kesehatan remaja. *Jurnal Kesehatan Komunitas (Journal of Community Health)*, 10(1), 96–103. <https://doi.org/10.25311/Keskom.Vol10.Iss1.1647>
- Oktaviani, L., Mufarikhah, L., Hanifa, S., & Tahun, O.D. (2024). The role of health education: Changing knowledge and attitude of adolescents in providing reproductive health. *Jurnal Penelitian Pendidikan IPA*, 10(11), 8500–8506. <https://doi.org/10.29303/jppipa.v10i11.8723>
- Pham, T., Goto, D., & Kakinaka, M. (2025). Adolescents' risky online behaviors and social desirability bias in Vietnam: Privacy disclosure and pornography use. *Cyberpsychology, Behavior, And Social Networking*, 28(4), 266–274. <https://doi.org/10.1089/Cyber.2024.0368>
- Pinandari, A.W., Kågesten, A.E., Li, M., Moreau, C., Van Reeuwijk, M., & Wilopo, S.A. (2023). Short-term effects of a school-based comprehensive sexuality education intervention among very young adolescents in three urban Indonesian settings: A quasi-experimental study. *Journal of Adolescent Health*, 73(1), S21–S32. <https://doi.org/10.1016/J.Jadohealth.2023.01.030>
- Purwatyningsih, E., & Nursanti, I. (2024). Model teori konsep keperawatan Nola J. Pender 'Health Promotion Model'. *Journal of Health and Medical Research*, 4(1), 76–85.
- Rahmadyanti, Kartiwi, Apriyanti, Febriyanti, F., & Fitriyani, L. (2025). The Effectiveness of video-based health education in improving adolescents' awareness of premarital sexual behavior. *Jurnal Penelitian Pendidikan IPA*, 11(11), 1303–1308. <https://doi.org/10.29303/Jppipa.V11i11.12774>
- Rahmawati, S., Setyowati, S., Budiati, T., & Rachmawati, I.N. (2023). Faktor-faktor yang memengaruhi kesehatan reproduksi remaja. *Journal of Telenursing (Joting)*, 5(2), 2632–2640. <https://doi.org/10.31539/Joting.V5i2.7713>
- Saquiring, J.B., Phichachan, N., Mathai, M.M., & Ernest, S. (2025). Role of school nurses in promoting adolescent health: Aligned with SDG 3 & SDG 11. (2025). *Vascular and Endovascular Review*, 8(4s), 59-67.
- Sari, M., & Wahyono, T.Y.M. (2023). Analisis pengetahuan dan perilaku beresiko pada remaja terhadap kesehatan reproduksi. *Jurnal Ners Pahlawan*, 4(2), 88–96. <https://doi.org/10.31004/jn.v8i1.21216>
- Setyowati, H., Sofiyanti, I., & Widyawati, S.A. (2022). Pemberdayaan remaja dalam optimalisasi kesehatan reproduksi remaja di Ma Miftahul Huda Tayu. *Indonesian Journal of Community Empowerment (Ijce)*, 4(1), 22-28 <https://doi.org/10.35473/Ijce.V4i1.1631>
- Tesfaye, Y., & Agenagnew, L. (2020). Knowledge, attitude, and practices of jimma teacher training college students toward risky sexual behaviors, Jimma, Ethiopia. *Sexual Medicine*, 8(3), 554–564. <https://doi.org/10.1016/J.Esxm.2020.04.006>

- Wardiati, W., Septiani, R., Agustina, A., Ariscasari, P., Arlianti, N., & Mairani, T. (2023). Reproductive health literacy of adolescents at public Islamic school: A cross-sectional study in Indonesia. *Al-Sihah: The Public Health Science Journal*, 15(1), 12–22. <https://doi.org/10.24252/al-sihah.v15i1.33133>
- UNICEF. (2024). *Adolescent health and development in Indonesia*. Retrieved from <https://www.unicef.org/indonesia/health/reports/adolescent-health-profile>
- World Health Organization. (2021). *WHO guideline on school health services*. Retrieved from <https://www.who.int/publications/i/item/9789240029392>
- World Health Organization. (2024). *Adolescent sexual and reproductive health*. Retrieved from <https://www.who.int/health-topics/adolescent-sexual-and-reproductive-health>