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Article

Reproductive and Sexual Health Education Using a Proactive Cognitive Approach to Adolescents' Preconception Knowledge

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A B S T R A C T

Background: Adolescents are vulnerable to reproductive and sexual health problems due to biological, psychological, and social changes. WHO data show that around 16 million girls aged 15–19 give birth annually, mostly in developing countries. The SDKI reported that 33–34% of adolescents begin dating before age 15, and 5.6% have engaged in premarital sex, including 4.5% males and 0.7% females. This study aimed to determine the effect of reproductive and sexual health education using a proactive cognitive approach on preconception knowledge among adolescent girls. **Methods:** A quantitative pre-experimental study with a one-group pretest-posttest design was conducted at SMAN 2 Tebo, Jambi, from February to March 2025. The population consisted of 171 female students in Year 12, with 62 respondents selected using stratified random sampling based on Lemeshow's formula. Data were collected using a validated questionnaire and analyzed using the Wilcoxon signed-rank test due to non-normal distribution. **Results:** The mean pretest knowledge score was 22.84, increasing to 30.92 in the posttest. Bivariate analysis showed a significant effect ($p = 0.000$; $p < 0.05$). **Conclusion:** Reproductive and sexual health education using a proactive cognitive approach significantly improves preconception knowledge among adolescent girls. This study suggests integrating reproductive and sexual health education into school curricula to enhance adolescents' knowledge.

I. INTRODUCTION

Background of the study:

Adolescents are a group particularly vulnerable to reproductive and sexual health issues due to the simultaneous biological, psychological and social changes they undergo (Wardani et al., 2024). This period is characterised by a growing curiosity about sexual matters, though this has not yet been matched by mature decision-making skills (Waluyo et al., 2022). Globally, premarital sexual activity is on the rise and contributes to a range of health issues, such as STIs, HIV/AIDS and unwanted pregnancies, with around 45% of new HIV infections occurring among those aged 15–24 (Latuheru et al., 2026);(Gebreyesus et al., 2019).

The phenomenon of early dating is a significant risk factor in adolescent sexual behaviour. In Southeast Asia, the prevalence of premarital sexual activity stands at around 8.5%, with variations between males and females (Leung et al., 2024). In Indonesia, around 33–34% of teenagers start dating before the age of 15, and 5.6% have had premarital sex, which contributes to the risk of unwanted pregnancies and sexually transmitted infections (Violita & Hadi, 2019);(Leung et al., 2024).

This issue is further complicated by the low level of knowledge among adolescents regarding reproductive health. Inadequate knowledge contributes to permissive attitudes and risky sexual behaviour (Nursanti et al., 2022). A lack of understanding can also lead to unwanted pregnancies, abortions, STIs and HIV/AIDS. Meanwhile, young people with good knowledge tend to adopt a more positive attitude towards prevention (Sumarni & Amin, 2024).

Literature Review:

Other studies indicate that a lack of reproductive health education is one of the main factors driving premarital sexual behaviour among adolescents. Appropriate education has been shown to improve knowledge and awareness regarding the maintenance of reproductive health (Setiawati et al., 2022). Research shows that around 16.6% of high-risk adolescents have engaged in premarital sex, influenced by peers, alcohol and media exposure, as well as low levels of reproductive health literacy (Gunardi et al., 2023); (Latuheru et al., 2026).

Gap Analysis:

Although the relationship between knowledge and sexual behaviour has been extensively studied, most studies still employ a conventional educational approach. Previous research has focused more on sexual attitudes and behaviour, whilst the aspect of preconception knowledge has received less attention (Nursanti et al., 2022). Innovative approaches such as the proactive cognitive method and school-based intervention studies involving adolescent girls remain limited (Setiawati et al., 2022);(Latuheru et al., 2026).

Rationale of the Study:

Innovative educational approaches are needed to improve the effectiveness of reproductive health education. Proactive cognitive methods emphasise the active involvement of individuals in understanding and applying information, thereby fostering a deeper understanding (Latuheru et al., 2026). This approach can also develop critical thinking and decision-making skills, as well as support healthy preconception preparation to prevent future pregnancy risks.

Purpose or Hypotheses of The Study:

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The aim of this study is to analyse the effect of reproductive and sexual health education using a proactive cognitive approach on knowledge of preconception preparation among adolescent girls at SMAN 2 Tebo in 2025. This study is expected to provide empirical evidence regarding the effectiveness of this innovative educational method. The research hypothesis is that there is a significant effect on the improvement of preconception knowledge among adolescent girls.

II. METHODS

Research design:

This study employed a quantitative approach using a pre-experimental design with a one-group pretest–posttest design to assess the effect of reproductive and sexual health education using a proactive cognitive method on adolescents' preconception knowledge.

Population and Methods of Sampling & Instrumentation:

The population consisted of 171 female students in Year 12 at SMAN 2 Tebo, Jambi. A total of 62 respondents were selected using stratified random sampling based on Lemeshow's formula. Inclusion criteria included female students who were unmarried, had never been pregnant, and were willing to participate. Sampling was conducted proportionally across seven classes using stratified random sampling.

Instrument:

The instrument was a structured questionnaire adapted from previous research, consisting of items measuring knowledge of reproductive and sexual health and preconception preparation. Responses were scored using a Likert scale, with higher scores indicating better knowledge. Content validity was based on prior validated studies, and reliability followed previously established measures. Data were collected using a self-administered questionnaire assessing knowledge of reproductive health, sexual health, and preconception preparation. The instrument showed good validity ($r = 0.30–0.80$) and reliability (Cronbach's alpha = 0.82).

Procedures and Time Frame:

Data collection was conducted from February to March 2025. The procedure included three stages: (1) pretest to assess baseline knowledge, (2) a 30-day intervention consisting of six sessions of reproductive and sexual health education using a proactive cognitive method with booklet, and (3) posttest conducted 15 days after the last session to evaluate changes in knowledge.

Analysis Plan

Univariate analysis was used to summarize the data (mean, minimum, maximum, and standard deviation). Normality was tested using the Kolmogorov–Smirnov test. Since the data were not normally distributed ($p < 0.05$), the Wilcoxon signed-rank test was applied to compare pretest and posttest scores and determine the effect of the intervention.

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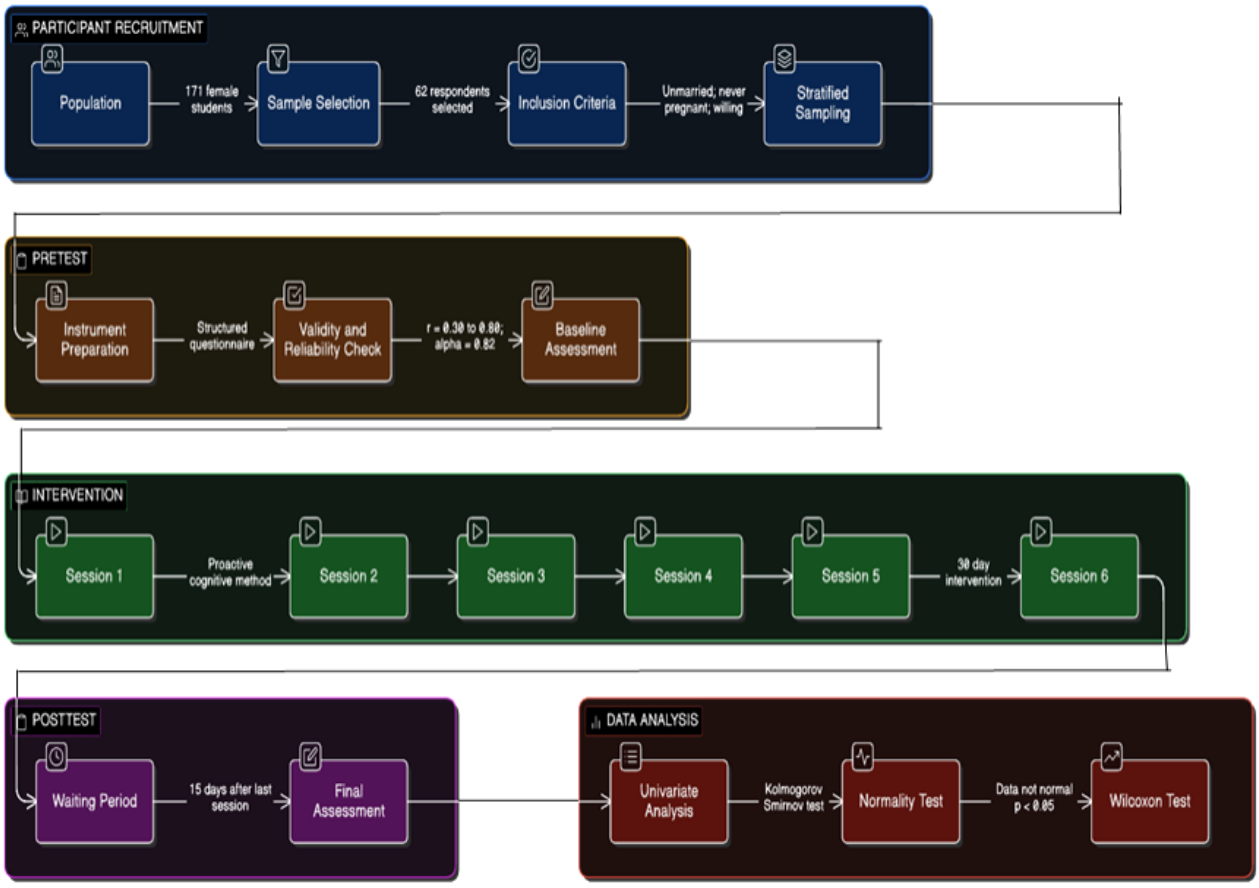


Figure 1. Flowchart of the Research Procedure and Analysis Plan

Scope and Limitations:

This study was limited by the absence of a control group, which may affect the ability to establish causal relationships. Additionally, the use of self-reported questionnaires may introduce response bias. The study was conducted in a single school setting, limiting generalizability to other populations.

Ethical Considerations

This study received ethical approval from the Faculty of Health Sciences, University of Indonesia (No. KET-052/UN2.F12.D1.2.1/PPM.00.02/2025) on 15 January 2025. Written consent has been obtained from the participants and their guardians. Confidentiality and anonymity are guaranteed throughout the study in accordance with the Declaration of Helsinki (World Medical Association, 2013)

III. RESULT

Respondent Characteristics

Table 1. Characteristics of Respondents (n = 62)

Variable	*Category*	*n*	*%*
Departements	*Language*	*9*	*14,5*
	Science	*29*	*46,8*
	Social Sciences	*24*	*38,7*
Age	*17 years*	*34*	*54,84*
	18 years	*27*	*43,55*
	19 years	*1*	*1,61*

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According to the research findings, the majority of respondents were from the Science stream, totalling 29 people (46.8%), followed by the Social Sciences stream with 24 people (38.7%), and the Language stream with 9 people (14.5%). By age, the majority of respondents were 17 years old, totalling 34 people (54.84%), followed by 18-year-olds, totalling 27 people (43.55%), and 19-year-olds, totalling just 1 person (1.61%). This indicates that the respondents were predominantly 17-year-old teenagers with a background in the Science stream.

Change in Adolescents' Preconception Knowledge

Table 2. Knowledge Before and After Intervention (n = 62)

Variabel	*Min*	*Max*	*Mean ± SD*
Before	*12*	*30*	*22,84± 3,45*
After	*25*	*35*	*30,92±1,88*

Based on the results of the analysis, pre-intervention knowledge scores ranged from a minimum of 12 to a maximum of 30, with an average of 22.84 ± 3.45. Following the intervention, knowledge scores increased, ranging from a minimum of 25 to a maximum of 35, with an average of 30.92 ± 1.88. This indicates an improvement in knowledge scores following the provision of education.

Effect of Reproductive and Sexual Health Education Using the Proactive Cognitive Approach

Table 3. Wilcoxon Signed Rank Test and Effect Size (n = 62)

Mean Rank	*Sum of Ranks*	*Z*	*p-value*
31,00	1891,00	-6,800	0,001

Before conducting the bivariate analysis, a normality test was performed using the Kolmogorov-Smirnov test, as there were 62 samples. The results of the normality test were p = 0.040 for the pre-test and p = 0.000 for the post-test; as both p-values were less than 0.05, it was concluded that the data were not normally distributed. Consequently, the bivariate analysis was continued using the Wilcoxon Signed Ranks Test. Based on the results of the Wilcoxon Signed Ranks Test, the mean rank was 31.00, with a sum of ranks of 1891.00 and a Z-score of -6.800. A p-value of 0.001 ($p < 0.05$) indicates that there is a significant difference between the scores before and after the intervention; therefore, it can be concluded that the education provided has an effect on improving the respondents' knowledge.

IV. DISCUSSION

The results of the study indicate that reproductive and sexual health education using a proactive cognitive approach significantly improves adolescent girls' preconception knowledge (p = 0.001). The increase in the mean score from 22.84 to 30.92, along with a shift in knowledge categories, demonstrates the intervention's effectiveness in enhancing overall understanding. These findings are consistent with the results of a meta-analysis stating that reproductive health education

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interventions have a moderate effect on improving adolescents' knowledge (SMD 0.59) (Guo, Xie, et al., 2025). This confirms that structured education is an effective strategy for improving reproductive health literacy. The impact of the intervention in this study was influenced by a proactive cognitive approach conducted over 30 days in six sessions. Repeated, participant-centred interventions have been shown to improve information retention and long-term understanding. A scoping review indicates that interventions conducted repeatedly and involving active participant engagement have a more significant impact on improving knowledge and attitudes (Putri et al., 2025).

The characteristics of the respondents in this study—the majority of whom were aged 17—support the effectiveness of the intervention, as adolescents at this stage have reached a more mature phase of cognitive development. This enables them to comprehend complex information regarding reproductive health and preconception care. Other studies have shown that school-based interventions targeting late adolescents are more effective in improving knowledge than those targeting younger age groups (Guo, Pan, et al., 2025). The selection of the research subjects is therefore appropriate in terms of cognitive development.

These findings are also consistent with other studies showing that reproductive health education significantly improves adolescents' knowledge from a 'poor' to a 'good' level following an intervention (Rahmawati et al., 2025). Other studies have also shown that the use of digital educational media can significantly improve adolescents' knowledge of reproductive health (Zaimy et al., 2025). This reinforces the view that innovative educational methods, including proactive cognitive approaches, are more effective than conventional methods.

This research reinforces the evidence that reproductive health education plays a vital role in preventing future health problems. Global studies show that comprehensive sexuality education is effective in reducing teenage pregnancies and increasing contraceptive use (Myat et al., 2024). Educational interventions have also been shown to improve health behaviours and reduce the risk of unintended pregnancies and sexually transmitted infections (Salam et al., 2016). Therefore, improving preconception knowledge from adolescence onwards is a vital investment in long-term reproductive health.

The proactive cognitive approach adopted in this study also has advantages over traditional methods as it emphasises the active involvement of participants. Research indicates that educational methods based on interaction, discussion and active participation yield more optimal results than one-way lectures (Khalesi et al., 2020). Furthermore, a multi-component approach combining education, communication and active engagement has been shown to enhance the effectiveness of interventions (Khalesi et al., 2020).

Implications:

The findings of this study indicate that the proactive cognitive method can serve as an effective strategy in school-based reproductive health education. An educational programme delivered in a series of sessions (six sessions over 30 days) has been shown to improve adolescents' understanding and knowledge retention. This supports global recommendations that reproductive health education should be comprehensive, interactive and ongoing in order to have the greatest possible

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impact (Myat et al., 2024). The implementation of this method has the potential to improve the long-term health of adolescents.

Research Contribution:

This study makes an important contribution to the development of reproductive health education methods by integrating a proactive cognitive approach. It also adds to the empirical evidence that school-based interventions with a simple design remain effective when active learning methods are employed. Furthermore, this study broadens the scope of research from sexual behaviour to preconception knowledge, an area that has received little attention to date. These contributions are relevant to the development of promotive and preventive programmes for adolescent reproductive health.

Limitations:

This study has limitations due to its pre-experimental design without a control group, meaning that a causal relationship cannot be firmly established. The use of self-report questionnaires also carries the potential for response bias. Furthermore, the study was conducted at only one school, so the generalisability of the results remains limited. External factors such as the influence of the media, family and the social environment have not been analysed in depth.

Suggestions:

Further research is recommended using a more robust design, such as a randomised controlled trial. The development of digital educational resources or interactive games could serve as an innovative approach to enhancing the effectiveness of interventions. Furthermore, the integration of reproductive health education into the school curriculum needs to be implemented in a systematic and sustainable manner. Collaboration between healthcare professionals and educational institutions also needs to be strengthened to improve adolescents' health literacy.

V. CONCLUSION

This study demonstrated that reproductive and sexual health education using a proactive cognitive method significantly improved preconception knowledge among adolescent girls, as evidenced by the increase in mean scores from 22.84 to 30.92 and supported by the Wilcoxon test results ($p = 0.001$). The improvement in knowledge categories further confirms that the research objective stated in the introduction was achieved, indicating that proactive cognitive-based education is effective in enhancing adolescents' understanding of reproductive health.

The results show that structured, repeated, and participatory educational interventions, like the 30-day six-session program, can effectively improve and sustain knowledge. These findings highlight the potential for integrating proactive cognitive approaches into school-based reproductive health programs. Future studies should use more rigorous designs and investigate digital or innovative media to strengthen the effectiveness and wider application of the approach.

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