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Original Research Paper

Peer education effectively increases adolescents' knowledge and attitudes in preventing teenage pregnancy

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Abstract
Globally, adolescent births in 2022 were estimated at 1.5 per 1,000 girls, with the highest birth rates in Sub-Saharan Africa (4.6). Adolescent mothers aged 10-19 are at higher risk of developing eclampsia, postpartum endometritis, and systemic infections. Babies born to adolescent mothers are at a higher risk of low birth weight, preterm birth, and severe neonatal conditions (WHO, 2023). In Indonesia, the birth rate in the adolescent age group in 2022 to 26.6% per 1,000 women of reproductive age (WRA) (WHO, 2023). In the Special Region of Yogyakarta, there were 225 cases of adolescent childbirth in 2022. The highest number of adolescent childbirth cases occurred in Sleman Regency with 64 cases, while the lowest was in Yogyakarta City with 25 cases (Dinkes DIY, 2022). This study aims to investigate the effectiveness of peer education in improving knowledge and attitudes among adolescents regarding the prevention of teenage pregnancy. A quasi-experimental design with a control group was used. Sampling was done through purposive sampling with a sample size of 36 respondents per group, calculated using the Lemeshow formula. The questionnaire instrument was tested for validity and reliability. Data analysis was performed using paired sample t-tests and independent sample t-tests. There were significant differences in average knowledge (p-value < 0.001) and attitudes (p-value < 0.001). Logistic regression analysis showed that sources of information and parental education did not affect improvements in adolescents' knowledge and attitudes regarding the prevention of teenage pregnancy.

Keywords: attitudes; knowledge; teenage pregnancy

1. Introduction

Adolescent pregnancy among individuals aged 10-19 years continues to present a critical global challenge requiring urgent solutions. In 2022, the global birth rate for girls aged 10-14 was estimated at 1.5 per 1,000 females. The highest rates of adolescent births were observed in Sub-Saharan Africa (4.6) and Latin America and the Caribbean (2.4). In developing countries, pregnancies among adolescents aged 15-19 reached 21 million, with 12 million of these resulting in live births. Adolescent mothers aged 10-19 are at higher risk of experiencing eclampsia, postpartum endometritis, and systemic infections compared to mothers aged 20-24 years. Infants born to adolescent mothers are also at higher risk of low birth weight, prematurity, and severe neonatal conditions (World Health Organization, 2022). In Indonesia, the adolescent birth rate in 2021 was 20.49 per 1,000 women of childbearing age, which increased to 26.6 per 1,000 women in 2022 (World Health Organization, 2022). Child marriage in Indonesia is concerning, with 65 per 1,000 cases recorded by religious courts in 2021 and 55 per 1,000 marriage dispensation requests in 2022 (Kemen PPPA, 2023) In the Special Region of Yogyakarta, there were 225 cases of adolescent births in 2022.

The highest number of adolescent births was reported in Sleman District with 64 cases, while the lowest was in Yogyakarta City with 25 cases (Dinkes DIY, 2022). High rates of adolescent pregnancy

in Sub-Saharan Africa are attributed to a lack of knowledge and attitudes towards preventing adolescent pregnancy, Studies in Tabriz, Iran, and Yogyakarta indicate that adolescents have low knowledge and negative attitudes towards adolescent pregnancy (Salfadila et al., 2023; Astuti et al., 2019). According to the World Health Organization (2022), reproductive health education is crucial for adolescents aged 10-14 as a preparatory measure. Research in India found that adolescent girls aged 15-19 had negative attitudes before receiving intervention, and a study in SMP N 1 Ubud, Bali, revealed that girls aged 14-17 had negative attitudes towards reproductive health (Putri et al., 2022). In Bangladesh, research on peer education shows that peer education can help reduce adolescent pregnancy rates by increasing awareness of the risks associated with adolescent pregnancies (Rashid et al., 2020). A study in the Philippines also shows that peer education plays a significant role in changing adolescents' attitudes toward sexual and reproductive health. A peer education program in high schools demonstrated an increase in knowledge about teenage pregnancy and contraception among adolescents. In Vietnam, peer education has also been used as a strategy to reduce adolescent pregnancy rates. A study conducted in several schools in Hanoi showed that peer education interventions, where adolescents educate their peers about reproductive health, can change attitudes toward teenage pregnancy and improve their understanding of prevention methods (Morales & Gutierrez, 2021). Thailand also has peer education initiatives to address adolescent pregnancy issues (Phan et al., 2021). A study in Chiang Mai showed that peer education can influence adolescents' understanding of contraception and pregnancy prevention. Peer education in Thailand has proven effective in creating open discussions on topics often considered taboo and can also enhance adolescents' understanding of the social and psychological impacts of teenage pregnancy (Nirandara et al., 2022).

Research conducted in Southern Ethiopia aligns with findings from Nigeria, where the majority of respondents were adolescents aged 15-19 years and young adults aged 20-24 years. Significant positive changes in knowledge were observed, attributed to the informative nature of peer education, which has the potential to enhance adolescent knowledge (Wondimagegene et al., 2023). A review indicates that in developing countries, adolescent pregnancy prevention efforts can be effectively supported through school-based education (Ratnasari & Sulistyaningsih, 2023). Research in Yogyakarta demonstrates that peer education is effective and significantly influences the improvement of reproductive health knowledge. The effectiveness of peer education is attributed to the ease of delivering sensitive information within age-matched groups and the social environment where peers are likely to emulate the behavior of individuals they view as role models (Wondimagegene et al., 2023; Setyaningsih et al., 2021).

A preliminary study at SMP Muhammadiyah 2 Gamping revealed through interviews with the counseling teacher that there was a case of adolescent pregnancy four years ago, and the school had not implemented sexual education by health professionals. Interviews with five students indicated that discussing adolescent pregnancy remains a taboo and that they had not received any education on pregnancy prevention. Peer education, as a health promotion approach for preventing adolescent pregnancy, should be considered as a determinant factor in adolescent pregnancy within the social ecology model for adolescent participation (UNICEF, 2020) According to the principles of Health Technology Assessment (HTA), peer education is a preventive activity that enhances health promotion (Kemenkes RI, 2022). Previous studies have evaluated the impact of peer education on various topics, including health education, menstruation, and HIV/AIDS. However, this study specifically assesses the effectiveness of peer education in enhancing both the knowledge and attitudes of adolescents regarding the prevention of adolescent pregnancy.

The research gap lies in the limited studies that specifically focus on the effectiveness of peer education in improving adolescents' knowledge and attitudes regarding the prevention of teenage pregnancy. While existing studies have explored the general impact of peer education on health topics

such as menstruation, HIV/AIDS, and general reproductive health, there is a lack of research that directly assesses how peer education influences the prevention of teenage pregnancy, particularly in areas with high teenage pregnancy rates such as Yogyakarta. Furthermore, previous studies have not extensively examined the role of peer education within the unique cultural and social context of Indonesia, where discussions on teenage pregnancy and reproductive health are still often considered taboo. This study aims to fill this gap by specifically analyzing peer education in improving adolescents' knowledge and attitudes towards pregnancy prevention, thus contributing to more targeted and culturally relevant health promotion interventions.

2. Research Methods

This study has undergone ethical review and was declared ethically feasible under letter number 1909/KEP-UNISA/III/2024. The research employed a quasi-experimental design with a control group. The intervention was conducted as follows: (1) Peer educator training, (2) A pretest was administered to both the experimental and control groups, (3) Peer educators provided education to the experimental group, (4) The intervention lasted for three weeks, and (5) A posttest was conducted for both groups (Bruce et al., 2017).

Table 1. Research Design

Group		Pretest	Intervention	Posttest
Experiment	O1	X	O2	
Control	O3	-	O4	

Keterangan :

O_1: *Pretest* of knowledge and attitudes of the experiment group adolescents

X: Peer education intervention provided of the experimental group, conducted in two sessions, each lasting approcimately ± 45 minutes

O_2: *Posttest* knowledge and attitudes of the experimental group adolescents

O_3: *Pretest* of knowledge and attitudes of the control group adolescents

O_4: *Posttest* of knowledge and attitudes of the control group adolescent

2.1.Population

The population for this study consists of adolescents aged 13 to 16 years enrolled at SMP Muhammadiyah 2 Gamping. The research was conducted from June to July 2024, with a total population of 213 individuals. The sample for the study includes adolescents aged 13 to 16 years attending SMP Muhammadiyah 2 Gamping. Sampling was done using a purposive sampling method.

2.2.Inclusion Criteria for Respondents

Seventh and eighth-grade students at SMP Muhammadiyah 2 Gamping, aged 13-16 years, who are willing to participate as respondents.

2.3.Exclusion Criteria for Respondents

Respondents who are unavailable due to urgent matters or who are absent during the study.

The sample size for the study was determined using the Lemeshow formula. Based on these calculations, the sample consisted of 36 respondents in the experimental group and 36 respondents in the control group, resulting in a total sample size of 72 respondents. Data collection was conducted after obtaining the research ethics approval letter, which was granted with the ethics number 1909/KEP-UNISA/III/2024.

2.4. Research Implementation Stage

The selection of peer educators was carried out with the following criteria:

a. The researcher discussed with the homeroom teacher regarding the criteria for selecting peer educators, which included students who are active, perform well academically, have good communication skills, are responsible, and possess self-confidence.
b. The homeroom teacher then provided the names of students selected to become peer educators based on the specified criteria.
c. The selected peer educators were seventh-grade students (Class A and Class B) and eighth-grade students (Class A and Class B).
d. Three peer educators were chosen from each class, resulting in a total of 12 selected participants (from Class VII A, VII B, VIII A, and VIII B).
e. The peer educator training was conducted for one day.

Subsequently, a pre-test was conducted for both the control and intervention groups, followed by peer education for the intervention group. Peer education was delivered by the trained peer educators. Peer education sessions were conducted twice, each lasting 90 minutes. The topics covered included adolescent reproductive health, teenage pregnancy, and methods for preventing teenage pregnancy. After the intervention, a post-test was administered again to both the control and intervention groups.

2.5.Statistical Tests

The statistical tests used were paired sample t-tests and independent sample t-tests, followed by multivariate analysis using multinomial logistic regression.

3. Results and Discussion

The sample included 36 respondents in the experimental group and 36 in the control group. Characteristics of the respondents are as follows:

Table 2. Distribution of Knowledge and Attitudes in Adolescent Pregnancy Prevention

No	Indicator	Experiment Group (Peer Education)				Control Group			
		Pretest		Posttest		Pretest		Posttest	
		F	%	F	%	F	%	F	%
1	Knowledge								
	Not enough	6	16.7	1	2.8	10	27.8	2	5.6
	Adequate	26	72.2	13	36.1	25	69.4	28	77.8
	Good	4	11.1	22	61.1	1	2.8	6	16.7
2	Attitudes								
	Negative	16	44.4	3	8.3	20	55.6	10	27.8
	Positive	20	55.6	33	91.7	16	44.44	26	72.2

Source: Primary Data, 2024

Based on Table 2, it is evident that among the 36 respondents in the control group and the 36 respondents in the experimental group, there was an observed improvement in knowledge and attitudes. Prior to the intervention, the majority of respondents in the experimental group had adequate knowledge and negative attitudes. Following the intervention, there was a notable increase in knowledge, with many respondents achieving a good level of understanding, and attitudes improved to reflect more positive outcomes. Conversely, in the control group, both pretest and posttest results predominantly indicated that respondents had adequate knowledge and positive attitudes.

Table 3. Normality and Homogeneity Tests

Indicator	Normality			Homogeneity
	Sig.	Batas	Keterangan	
Knowledge				
Pretest Experiment	0.145	> 0,05	Normal	0,815
Posttest Experiment	0.115	> 0,05	Normal	(Homogeneous)
Pretest Control	0.093	> 0,05	Normal	
Posttest Control	0.200	> 0,05	Normal	
Attitudes				
Pretest Experiment	0.129	> 0,05	Normal	0,198
Posttest Experiment	0.064	> 0,05	Normal	(Homogeneous)
Pretest Control	0.130	> 0,05	Normal	
Posttest Control	0.200	> 0,05	Normal	

Source: Primary Data, 2024

Table 3 indicates that the data for pretest and posttest knowledge and attitudes in both groups are normally distributed, with significance values greater than 0.05. Homogeneity tests using Levene's test also show that the data are homogeneous, with significance values greater than 0.05.

Table 4. Knowledge and Attitude Differences in the Experimental Group Before and After Intervention

Variable	Paired Sample T-Test			Independent T-Test	
	Mean	Std. Deviation	Sig.	Mean Difference	Sig
Knowledge					
Pretest–posttest Experiment	16.556	11.790	< 0.001		
Pretest – Posttest Control	5.944	6.360	< 0.001	13.528	< 0.001
Attitude					
Pretest-posttest Experiment	22.750	12.691	< 0.001		
Pretest-Posttest Control	6.083	9.470	< 0.001	17.750	< 0.001

Source: Primary Data, 2024

Based on Table 4, the results of the paired sample t-test reveal a significant difference in the mean scores for pretest and posttest knowledge, with the mean score for the experimental group being 16.556 and for the control group being 5.944. There was also a significant difference in the improvement of attitudes, with the mean score for the experimental group being 22.750 and for the control group being 6.083. The independent t-test results show a difference in knowledge scores of 13.528 and in attitude scores of 17.750, with a p-value of < 0.001, indicating a statistically significant relationship ($p < 0.05$).

Table 5. Information Sources and Knowledge on Adolescent Pregnancy Prevention

Variable Independent	Varibale Dependen	
	Knowledge	Attitudes
	P-value	
Parental education	0,486	0,529
Information source	0,197	0,856

Source: Primary Data, 2024

Based on Table 5, the variable of parental education does not meet the criteria for multivariate analysis in relation to knowledge and attitudes (significance value > 0.25). Additionally, the variable of information sources also does not meet the criteria for multivariate analysis with regard to attitudes

(significance value > 0.25). However, the variable of information sources does meet the criteria for multivariate analysis concerning knowledge (significance value < 0.25).

Table 6. Information Sources and Knowledge on Adolescent Pregnancy Prevention

Variable	P-Value	Odd Ratio	95% CI	
			Lower	Upper
Knowledge				
Information source				
Electronik media	0,196	0,386	0,091	1,635

Source: Primary Data, 2024

Based on Table 6, the multivariate analysis indicates that there is no effect of information sources on knowledge regarding adolescent pregnancy prevention. This finding is supported by a p-value greater than the significance level of 0.05. The results from the multinomial logistic regression analysis further confirm that information sources do not significantly impact knowledge related to adolescent pregnancy prevention, with a p-value of 0.395 (> 0.05).

Among information sources, electronic media emerged as a potential factor influencing knowledge, with the lowest significance value of 0.196 and an odds ratio of 0.386. Given that information is now easily accessible through electronic media (e.g., TV, mobile phones, radio), it is suggested that if adolescents use electronic media wisely, it could enhance their knowledge and lead to more positive attitude changes regarding adolescent pregnancy prevention.

3.1. Effectiveness of Peer Education on Improving Adolescent Knowledge about Teen Pregnancy Prevention

The analysis reveals a significant increase in the average scores of knowledge from pretest to posttest, with a mean difference of 16.556. This indicates that peer education is effective in enhancing adolescents' knowledge about preventing teen pregnancy, as supported by a p-value of <0.001. Peer educators employed easily understandable language, such as Javanese, facilitating better reception of new information. Peer educators also conducted group discussions, which broadened participants' understanding and allowed them to inquire about unclear aspects without embarrassment. The educational materials used were instrumental in conveying reproductive health and teen pregnancy information effectively.

This study aligns with the social ecology model for adolescent participation (UNICEF, 2020) Peer education, characterized by its informative, voluntary, inclusive, and accountable nature, enables adolescents to assimilate information effectively and enhances their knowledge in preventing teen pregnancy. Research conducted in India shows that peer education models significantly improve adolescents' reproductive health knowledge, while studies in Malaysia demonstrate that peer education not only is effective but also positively impacts school children's health (Azira et al., 2020; Sari et al., 2021). Among adolescents in China, there is a noted deficiency in knowledge and varied perceptions regarding sex education, underscoring the need for efficient sexual education to guide healthy reproductive and sexual health practices (Siva et al., 2021). The study conducted by Sharmila (2021) revealed that half of the respondents demonstrated a low level of awareness regarding teenage pregnancy, despite exhibiting positive attitudes toward the issue. This finding indicates a discrepancy between attitude and knowledge, which may pose a significant challenge in the effective prevention of teenage pregnancy. Meanwhile, the findings from (Santisouk et al, 2020), which reported low Teen Pregnancy Health Literacy (TPHL) scores, underscore the importance of comprehensive sexual education for adolescents as a key strategy to improve reproductive health and prevent early pregnancies. Furthermore, research by Yaya et al. (2020) found that teen birth rates tend to be higher

among adolescents from low-income families, those with no formal education, and those residing in rural areas. These findings highlight the critical role of socioeconomic factors and access to education in influencing the risk of teenage pregnancy.

The analysis of knowledge scores indicated a notable improvement primarily among eighth-grade students, aged 14, and female adolescents. It was observed that sources of information and parental education did not significantly influence adolescent knowledge enhancement. The observed increase in knowledge is attributed to peer education interventions. Media, particularly electronic media, has potential as an influential information source, with a significance level of 0.196 and an odds ratio of 0.386. If adolescents utilize electronic media wisely, it can significantly improve their knowledge on teen pregnancy prevention.

Findings from related studies (Adekola & Mavhandu-Mudzusi, 2022) suggest that inadequate supporting infrastructure and access to sexual education resources could be improved. Parents desire positive outcomes for their children, thus requiring access to resources that can enhance knowledge and prevent teen pregnancies. In China, teachers and schools are identified as the most common sources of information, emphasizing the need for parents to allocate time for discussing sexual and reproductive health with their children (Siva et al., 2021). Electronic media is widely used by adolescents to seek reproductive health information (Kurniawan & Rochmadhona, 2021). Parental education is causally linked to early marriage occurrences among adolescents, with lower parental education levels increasing the risk of early marriage and subsequent teen pregnancy (Setyaningsih et al., 2021). Parental education and media play an important role in sexual education, but schools also have a very significant role in providing more formal and structured knowledge. A comprehensive and continuous sexual education curriculum in schools can bridge the information gap that may occur at home and help adolescents understand the consequences of their sexual behavior.

3.2. Effectiveness of Peer Education on Improving Adolescent Attitudes Towards Teen Pregnancy Prevention

The results indicate a significant change in attitudes, with an average difference of 22.750 between pretest and posttest scores following peer education intervention. This demonstrates that peer education effectively improves adolescents' positive attitudes towards preventing teen pregnancy, as evidenced by a p-value of <0.001. Peer education offers credibility and effectiveness as it helps adolescents understand their issues quickly and accept new information readily. The acquisition of new information supports a direct positive change in attitudes.

Most notable improvements in positive attitudes were observed among female adolescents in seventh grade and aged 14 years. This finding supports the social ecology model for adolescent participation (UNICEF, 2020), where peer education serves as a strategic effort to enhance positive attitudes, build awareness, and develop adolescents' skills and capacities to prevent teen pregnancy.

Chi-square tests reveal a significant relationship between knowledge and attitudes, with a p-value of 0.016, indicating a meaningful connection between improved attitudes and knowledge. Peer education is an effective health promotion method for fostering positive attitude changes, where consistent knowledge updates lead to corresponding attitude shifts (Nurmala et al., 2021). Research at Higher Secondary School Durg highlights that peer education improves adolescents' attitudes, with reproductive health education motivating them to avoid or prevent teen pregnancies. Consistent findings across studies suggest that peer education is effective in enhancing adolescents' attitudes towards reproductive health, as it fosters openness and willingness to discuss taboo or sensitive topics (Nurfazriah & Hartati, 2023), Research in Spain found that adolescents aged 14-16 exhibited higher scores for positive attitudes towards sexuality (García-Vázquez et al., 2020). Peer education plays a very important role in shaping adolescents' attitudes towards reproductive health topics, including

sexuality and the prevention of teenage pregnancy. One of the reasons why peer education is so effective is that adolescents are often more open to discussing issues considered taboo or sensitive with their peers than with adults. Peers are perceived to have a better understanding of experiences similar to those of other adolescents, making the discussions more relational and non-judgmental.

Moreover, research findings showing consistent knowledge improvement also emphasize that ongoing education about reproductive health plays a crucial role in attitude change. This suggests that it is not enough to provide information only once; continuous efforts are needed to ensure better understanding and more positive attitude changes.

The analysis of the impact of parental education on adolescent knowledge revealed no significant effect on knowledge improvement. The increase in knowledge is attributed to peer education interventions. However, the level of parental education significantly influences adolescents' attitudes towards reproductive health. Parents with higher education levels are more likely to openly discuss reproductive health topics with their children, which contributes to better understanding and positive attitudes among adolescents (Azira et al., 2020). According to the researcher, the role of parental education in shaping adolescents' mindset is very important because parental education can influence how adolescents view and process information, including knowledge about reproductive health. Parents with higher levels of education often have greater access to valid information and can guide their children to seek trustworthy sources of information. However, if parents are not actively educating their children about important issues like reproductive health, adolescents' knowledge about the topic may be limited. In this case, parental education is not always directly related to improving adolescents' knowledge, but rather to creating an environment that supports exploration and better understanding.

4. Conclusion

The use of peer education as a method for providing education to both male and female adolescents is effective in enhancing their knowledge and attitudes towards teen pregnancy prevention. The confounding factors of information sources and parental education do not significantly impact the improvement in adolescent knowledge and attitudes regarding teen pregnancy prevention. Future research should aim to develop a more rigorous framework to determine the short- and long-term effects of peer education.

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