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The Effect of Education on Improving Adolescents' Knowledge and Self Efficacy Regarding HIV/AIDS: A Pre-Experimental Study

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ABSTRACT

Background: HIV/AIDS remains an escalating global health issue, particularly among adolescents. Low knowledge and poor self-efficacy regarding HIV/AIDS prevention serve as primary risk factors for risky behaviors in this population. School-based education is recognized as an effective strategy to enhance adolescents' awareness and capability in preventing HIV/AIDS. This study aimed to analyze the effect of an HIV/AIDS educational intervention on the knowledge and self-efficacy of adolescents at SMAN 3 Palu.
Methods: This study utilized a pre-experimental one-group pretest–posttest design. A total of 61 eleventh-grade students were selected via purposive sampling to participate in two structured educational sessions (2 × 60 minutes) covering the definition of HIV/AIDS, transmission routes, prevention strategies, and the correction of common misconceptions. The learning methods included interactive lectures, small group discussions, and role-plays. Knowledge was measured using a 25-item questionnaire (score range 0–100), and self-efficacy was assessed using a 15-statement questionnaire (score range 15–75). Data were analyzed using the Wilcoxon Signed-Rank Test (α = 0,05).
Results: The findings demonstrated a significant increase in the mean scores of both knowledge (mean pretest = 67,3, mean posttest = 92,7, p = 0,000) and self-efficacy (mean pretest = 42,6, mean posttest = 57,3, p= 0,001) following the educational intervention.
Conclusion: School based HIV/AIDS educational interventions are significantly associated with improved knowledge and self efficacy scores among adolescents.

INTRODUCTION

HIV/AIDS remains one of the most pressing global public health challenges. Approximately 39.0 million people were living with HIV at the end of 2022, with 1.3 million new infections recorded throughout that year. Adolescents and young adults aged 15–24 years account for roughly 25% of all new HIV infections globally, rendering this cohort a primary priority in prevention programs (UNAIDS, 2023). At the national level, Indonesia recorded 526,841 cumulative HIV cases up to June 2023, with a significant proportion identified within the young productive age group (Kementerian Kesehatan Republik Indonesia, 2023). Regionally, in Palu City in 2023, approximately 23.5% of HIV cases were found in the 15–24 age group (Dinas Kesehatan Provinsi Sulawesi Tengah, 2023). The high proportion of cases among youth underscores the

urgency for contextualized and community-based prevention interventions, particularly through school-based approaches as a setting that can systematically reach the adolescent population.

Adolescents are uniquely vulnerable to HIV/AIDS due to a combination of psychosocial developmental factors and behaviors. According to Erikson's theory of psychosocial development, adolescence is characterized by identity exploration and social role experimentation, which can prompt exploratory behaviors, including risky sexual behaviors. Inaccurate knowledge about HIV/AIDS, including accompanying myths and stigmas, further reinforces barriers to preventive actions. Consequently, low HIV/AIDS knowledge among adolescents not only directly contributes to risky behaviors but also undermines their self-efficacy to take necessary preventive actions. This highlights the need for educational interventions that simultaneously strengthen knowledge and self-efficacy while considering the psychosocial factors influencing adolescent decision-making (Ansar & Amirudin, 2025; Purwanto & Cinta, 2025; Wilandika et al., 2023)

In Indonesia, numerous studies have documented low levels of HIV/AIDS knowledge among adolescents. Factors such as age, gender, parental education level, social support, and information sources significantly influence adolescent HIV/AIDS knowledge (Ismawati et al., 2025). Prior research has proven that health education can significantly increase adolescents' knowledge about HIV/AIDS (Trimawartinah & Alfiorelia, 2025). A previous meta-analysis further reinforced evidence that structured educational programs correlate positively with increased knowledge and attitudinal changes. Nonetheless, a synthesis of these findings reveals a consistent pattern: most studies in Indonesia only measure knowledge or attitudes without evaluating self-efficacy as a distinct psychological construct that is more proximal to behavior change (Ratnawati et al., 2024; Thome, 2023).

Self efficacy defined as an individual's belief in their capability to execute specific actions—is a central construct in Bandura's Social Cognitive Theory. Bandura explains that self-efficacy is formed through four primary sources: mastery experiences, vicarious experiences (social modeling), verbal persuasion, and the interpretation of physiological states (Vaughan-Johnston & Jacobson, 2020). In the context of HIV prevention, self-efficacy acts as a mediator between knowledge and preventive behavior: individuals with good knowledge but low self-efficacy are less likely to translate that knowledge into actual behavior. Thus, interventions that merely enhance knowledge without strengthening self-efficacy may fail to produce sustainable behavior change (Fismasari et al., 2025; Myrick & Yang, 2022).

The research gap addressed by this study is that although HIV/AIDS intervention studies on Indonesian adolescents have been conducted, none have specifically evaluated the simultaneous effects of school-based educational interventions on knowledge and self-efficacy within the context of vocational high schools in Palu. Most previous studies were conducted in large urban areas or were descriptive without structured intervention components, limiting the generalizability of findings to regional school contexts with different sociodemographic characteristics (Witdiawati et al., 2023). Schools provide a strategic setting for health interventions as they allow for a broad reach of the adolescent population simultaneously within a structured and supportive environment. However, evidence from schools outside Java remains highly limited; hence, research in Central Sulawesi provides an important contribution to developing contextualized HIV prevention programs.

The novelty of this study lies in the explicit utilization of Bandura's Self-Efficacy Theory as the conceptual foundation for the intervention, the simultaneous evaluation of knowledge and self-efficacy as primary outcomes (which is rarely done in local intervention studies), and its execution within a regional vocational high school setting outside Java, where school-based intervention data are severely lacking. This study aimed to analyze the effect of HIV/AIDS education on the knowledge and self-efficacy of adolescents at SMAN 3 Palu.

METHODS

This study utilized a pre-experimental one-group pretest–posttest design. The study population consisted of all eleventh-grade students at SMK Negeri 3 Palu (N = 678). A sample of 61 students was selected using purposive sampling based on inclusion criteria (actively

registered, willing to participate, and present for all sessions) and exclusion criteria (declined informed consent or absent during any session). The sample size was calculated using the formula for the difference between two paired means (α = 0,05, *power* 80%, Cohen's *d* = 0,5), yielding a minimum sample of 54 participants, which was rounded to 61 to account for a 10% anticipated dropout rate. The instruments consisted of two components: (1) an HIV/AIDS Knowledge Questionnaire (25 items); CVI = 0,85; Cronbach's α = 0,78), and (2) an HIV/AIDS Self-Efficacy Scale (15 statements); CVI = 0,82; Cronbach's α = 0,81), developed based on the four sources of self-efficacy in Bandura's Social Cognitive Theory.

The intervention was delivered across two face-to-face sessions (60 minutes each, totaling 120 minutes). Session 1 included an interactive lecture on the definition, epidemiology, transmission routes, and myth-busting of HIV/AIDS (30 minutes), followed by small group discussions (20 minutes) and a Q&A session (10 minutes). Session 2 focused on prevention strategies and self-efficacy enhancement through role-play scenarios of high-risk situations (30 minutes), followed by group reflection (20 minutes) and a closing wrap-up (10 minutes). The media utilized included interactive PowerPoint presentations, leaflets, and whiteboards. The pretest was administered 30 minutes before Session 1, and the posttest was conducted 30 minutes after Session 2 using identical instruments. Data normality was assessed using the Shapiro-Wilk test. Because the data were not normally distributed ($p < 0,05$), differences between pretest and posttest scores were analyzed using the Wilcoxon Signed-Rank Test.

RESULTS

Table 1. Frequency Distribution of Respondents Based on Age, Gender, and Information Source regarding HIV/AIDS

Characteristic	Frequency (n)	Percentage (%)
Age		
16 Years Old	32	53
17 Years Old	21	34
18 Years Old	8	13
Gender		
Male	44	72
Female	17	28
Source of Information on HIV/AIDS		
Internet	55	90
Television	6	10

Table 1 displays the characteristics of the respondents. Based on age, 32 respondents (53%) were 16 years old, 21 respondents (34%) were 17 years old, and 8 respondents (13%) were 18 years old. In terms of gender, 44 respondents (72%) were male, and 17 respondents (28%) were female. Regarding the source of information about HIV/AIDS, 55 respondents (90%) obtained information via the internet, and 6 respondents (10%) from television.

Table 2. Respondents' Knowledge Level regarding HIV/AIDS

Knowledge Level regarding HIV/AIDS	Pre-Education		Post-Education	
	f	%	f	%
Low / Poor	5	8	2	3
Moderate / Sufficient	36	59	0	0
Good	20	33	59	97

Table 2 demonstrates that during the pretest, 5 respondents (8%) had a poor knowledge level, 36 respondents (59%) had a sufficient knowledge level, and 20 respondents (33%) had a good knowledge level. After the posttest, those with a poor knowledge level decreased to 2 respondents (3%), while those with a good knowledge level increased drastically to 59 respondents (97%).

Table 3. The Effect of Education on the Increase of Adolescent Knowledge regarding HIV/AIDS

Knowledge	n	Mean	p
Pre-Educational Intervention	61	67,3	<0.001
Post-Educational Intervention	61	92,7	

Table 3 shows that the mean knowledge score before education was 67.3, which increased to 92.7 after the intervention. Statistical analysis indicated a significant effect of educational delivery on increasing respondents' knowledge about HIV/AIDS (p=0.000, p<0,05).

Table 4. The Effect of Education on Adolescent Self-Efficacy regarding HIV/AIDS

Self Efficacy	n	Mean	p
Pre-Education	61	42,6	0,001
Post-Education	61	57,3	

Table 4 indicates that the mean self-efficacy score before education was 42.6, which rose to 57.3 post-intervention. Statistical analysis showed a significant effect of educational delivery on enhancing respondents' self-efficacy regarding HIV/AIDS (p=0.001, p<0,05).

DISCUSSION

This study evaluated the relationship between a school-based HIV/AIDS educational intervention and changes in adolescent knowledge and self-efficacy using a one-group pretest–posttest design with Wilcoxon Signed-Rank Test analysis. The primary finding of this study is that the HIV/AIDS educational intervention was associated with significant improvements in both adolescent knowledge (pretest 67,3, posttest 92,7, p = 0,000) and self efficacy (pretest 42,6, posttest 57,3, p = 0,001).

These findings are consistent with a meta-analysis showing that adolescent HIV education programs consistently improve knowledge scores and behavioral intentions with moderate-to-large effect sizes (Ratnawati et al., 2024). Local studies have also reported similar knowledge increases post-intervention, although they did not measure self-efficacy as a distinct outcome (Trimawartinah & Alfiorelia, 2025). A key distinction of this study compared to previous research in Indonesia is the explicit application of Bandura's Self-Efficacy Theory in designing the intervention. Consequently, the role-play methods and small group discussions were not merely utilized to convey information but were specifically engineered to foster mastery experiences and vicarious learning the two primary sources of self-efficacy (Rosenstock et al., 2020). (Corral-Gil et al., 2023). From a behavioral theory perspective, the significant increase in self-efficacy in this study can be elucidated through the following mechanisms: (1) Mastery experiences were established through role-play exercises where students practiced assertive responses to high-risk situations, providing an immediate experience of success that bolstered self-confidence. (2) Social modeling (vicarious experiences) was achieved as students observed their peers successfully demonstrating preventive behaviors in simulated scenarios, which, according to Social Cognitive Theory, is more effective than passive lectures in building self-efficacy. (3) Verbal persuasion was provided through positive facilitator feedback and group reinforcement during discussions. This theory-driven approach aligns with recommendations stating that theory-based interventions are more effective in altering psychosocial outcomes than standard health education (Bin Anuar et al., 2024; Fallah-Karimi et al., 2025; Meade, 2024).

The substantive increase in knowledge also holds clinical significance. Correcting misconceptions regarding HIV transmission routes (e.g., casual contact transmission) is a vital foundation for reducing stigma and promoting HIV testing behaviors (Witdiawati et al., 2023). School-based reproductive health education programs can successfully enhance students' understanding and behavior (Nurhayati et al., 2025). Self-efficacy directly influences risky sexual behaviors, further highlighting the importance of effective interventions for adolescents (Corral-Gil et al., 2023). Nonetheless, it must be emphasized that because this study lacked a control group, it cannot be definitively concluded that the intervention *caused* the observed improvements.

While the changes are associated with the educational intervention, alternative explanations such as maturation effects, exposure to information from social media during the study period, or the Hawthorne effect cannot be entirely excluded. This interpretation aligns with methodological recommendations for pre-experimental designs without control groups.

Several limitations of this study must be explicitly acknowledged: (1) The absence of a control group is the primary limitation, restricting causal inference capabilities. (2) The relatively small sample size (n = 61) from a single school limits the generalizability of findings to broader vocational high school adolescent populations in other regions or with different sociodemographic characteristics. (3) The lack of long-term follow-up prevents assessment of the sustainability of the intervention's effects on knowledge and self-efficacy beyond the immediate post-intervention period. (4) Purposive sampling may introduce selection bias if students who volunteered to participate differed systematically from those who did not. Based on these limitations, future research should: employ experimental designs with randomization and control groups to strengthen causal claims, expand the scope to multiple schools across diverse areas (urban/rural, varying socioeconomic backgrounds) to enhance representativeness, explore the integration of digital media, applications, peer education, and gamification as delivery methods to better engage contemporary adolescents.

CONCLUSION

A school-based HIV/AIDS educational intervention was associated with increased knowledge and self-efficacy among adolescents at SMK Negeri 3 Palu. However, due to the limitations of the pre-experimental design without a control group, these findings should be interpreted as preliminary evidence rather than definitive proof of causality. Future studies are recommended to employ randomized controlled trials or quasi-experimental designs with control groups, larger sample sizes, multi-school settings, and longitudinal follow-up assessments to evaluate the sustainability of the intervention effects and their long-term impact on adolescent behavior.

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