Ludo Edutainment: A Media to Improving Knowledge and Attitude about HIV-AIDS Among Senior High School Students in Yogyakarta

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ABSTRACT

***Background**: Indonesia had the third-highest number of new HIV/AIDS cases in the Asia-Pacific. Adolescents are more vulnerable, for almost half of all new cases worldwide. HIV/AIDS cases among 15-19-year-olds have increased in Indonesia for the last three years. Media is necessary to increase teenagers' awareness of and favorable attitudes about HIV/AIDS prevention. **Objective**: This study assessed the influence of the Ludo Healthy Smart Game on adolescents' knowledge and positive attitudes toward HIV/AIDS prevention. **Methods**: The study was quasi-experimental with a non-equivalent control group design. Senior high school students in Yogyakarta were the study samples. There were 130 respondents divided into two groups. Questionnaires used for data collection have been subject to validity and reliability tests. Univariate and bivariate data analyses were used. **Results**: This study found that the Ludo Healthy Smart Game is effective in improving adolescents' knowledge about HIV/AIDS (p=0.000). The Ludo Healthy Smart Game does not affect positive attitudes toward HIV/AIDS prevention (p<0.005). However, there was an improvement in adolescents' attitudes following the treatment. **Conclusion**: The Ludo Healthy Smart Game can be used as health educational media to increase knowledge about HIV/AIDS among adolescents. The higher the adolescents' knowledge about HIV/AIDS, the better their behavior toward HIV/AIDS prevention.*

***Keywords**: HIV/AIDS, Knowledge, Ludo, Prevention, Video*

INTRODUCTION

The World Health Organization (WHO) defines that adolescence is the period of life between the ages of 10 and 19 and also between childhood and adulthood. The survey showed that adolescents accounted for 46 million of Indonesia's 270.2 million people in 2021, or 17% of the country's total population (United Nations Children's Fund, 2021).

The fast physical, mental, and emotional development of youth impacts how they feel, think, simply decide, and interface with their general surroundings. Adolescents are in danger of conceptive medical problems or health issues. They are highly susceptible to harm, disease, and death. However, it is also the most crucial time to establish healthy habits (Hurlock, 2009).

According to the World Health Organization (2023a), adolescents' certain behaviors associated with diet, physical activity, sexual activity, and drug use can either protect or harm their own current and future health. HIV-AIDS is one of the reproductive health problems among adolescents, but which can be prevented. Indonesia had the third-highest number of new HIV-AIDS cases in the Asia-Pacific (UNAIDS, 2019). Adolescents are at the greater risk, with almost half of all new cases worldwide. HIV-AIDS cases among 15-19-year-olds have increased in Indonesia for the last three years (World Health Organization, 2023b).

In 2023, there were 19 new HIV cases in the Yogyakarta. Meanwhile, the number of AIDS cases was 45. The total number of HIV infections by March 2023 was calculated at 7,003 cases and AIDS at 2,095 cases. The largest proportion was in the 20-29 age group (LSM Victory Plus, 2023). This shows that the process of HIV transmission occurs during adolescence,

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considering that the incubation period for HIV to become symptomatic is at least 8-10 years (Taisheng Li, 2022).

HIV is an infection that targets the body's immune system. The disease's most advanced stage is AIDS. HIV can spread through a contaminated person's bodily fluids, including their blood, breastmilk, semen, sperm, and vaginal secretion. This suggests that engaging in risky sexual activities can lead to HIV-AIDS (World Health Organization, 2023b).

According to the Indonesian Adolescent Reproductive Health Survey, 33% of adolescents reported having dating and having friends who had premarital sex (Infodatin Pusat Data dan Informasi Kementerian Kesehatan RI, 2016). A review led in East Java observed that there were very striking contrasts in the way of behaving of male and female young people. Risky sexual behavior was engaged in by 514 respondents, or 49.4%, according to the study. Males made up 56.6% of the total 514 respondents, while females made up 43.7% (Susanto *et al.*, 2016).

A previous study in Yogyakarta found that 18.5% of the 481 high school students stated that they had risk for premarital sex (Ayu *et al.*, 2019). Another study which was carried out in Yogyakarta showed that 51.8% or 192 students said they had accessed pornography (Meilani, Setiyawati and Barasa, 2020). Teens' lifestyles can be influenced by porn, particularly in terms of their sexual preferences and consumption of porn. The sexual attitudes and actions of adolescents are significantly influenced by pornography (Grubbs and Perry, 2019).

A study of premarital sexual behavior among adolescents revealed that males reported having premarital sex more often than females. The male respondents made sense of that the explanation was interest (57.5%) and the female respondents (38%) expressed that it simply worked out (Kemenkes RI, 2017). This demonstrates a lack of comprehension regarding HIV-AIDS prevention and reproductive health in adolescents. As many as 38.5% of adolescents in the Ponorogo, East Java, study have a low level of knowledge about reproductive health (Ernawati, 2018). Whereas in Yogyakarta, it was found only 18.5% of adolescents have a good knowledge level about reproductive health (Retno et al., 2015). Therefore, improving knowledge levels among adolescents toward reproductive health and HIV-AIDS is crucial.

Health promotion for adolescents requires specific strategies in terms of the methods and media to be deployed. Adolescents are active. They like things that are interesting and challenging, such as social media and games. Edutainment is explained as a communication strategy which includes educational and social processes wrapped in an entertainment program such as games, posters, and videos. The use of edutainment has been proven to provide better understanding to adolescents in a more interesting way (Port *et al.*, 2022). This study assessed the influence of the Ludo Healthy Smart Game on adolescents' knowledge and positive attitudes toward HIV-AIDS prevention.

Three elements of Lawrence Green's theory were predisposing, reinforcing and enabling factors. The level of knowledge and attitude was part of predisposing factor related to behavior (Porter, 2016). Improving attitude and awareness in order to avoid HIV AIDS among adolescents is a necessary strategy in health promotion.

METHODS

Quasi-experimental with a non-equivalent control group was this research design, held from April to June 2024. High school students in Yogyakarta were the participants of this study. According to Lemeshow, the mean difference hypothesis test formula was used to determine the sample size (Leny and Lemeshow, 2009). This study involved 130 respondents. The respondents were divided into two groups, the experimental and the control group, with 65 respondents for each group. Two senior high schools in Bantul and Sleman regencies were selected randomly and from the selected schools, two classes for grade XI were randomly selected. The sample consisted of students who were willing to participate as respondents and had parental consent.

The experimental group consisted of respondents who were given information about HIV-AIDS through the Ludo Healthy Smart Game and the control group was treated by video education. Ludo and video consist of information about HIV-AIDS, signs and symptoms, diagnosis, prevention, and therapy.

Ludo Healthy Smart Game and video: Ayo Cegah HIV (Lets Prevent HIV!)

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had intellectual property rights from Kementerian Hukum dan Hak Asasi Manusia with the numbers EC00202441773, 27 Mei 2024 for Ludo, and EC00202436143, 7 Mei 2024 for video. The Ludo Healthy Smart Game is played by five people. It is composed of four players and one person as a leader also as a peer educator. This game set consists of a game board, dice, pawns, and a set of cards with questions and the answer keys. Figure 1 shows the Ludo Healthy Smart Game board.

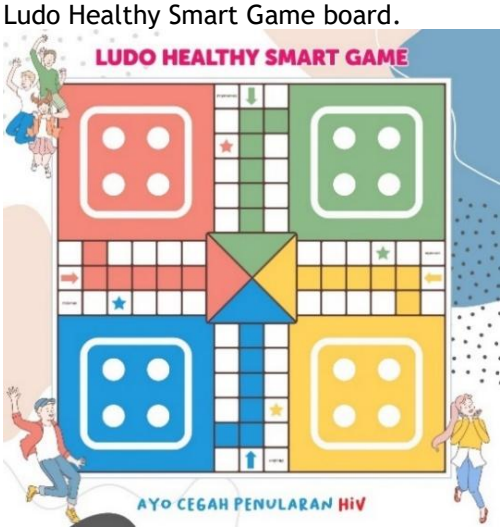

Figure 1. The Ludo Healthy Smart Game board

The guide to playing the Ludo Healthy Smart Game is as follows:

1. Each player places a pawn in a large box (prison) which is their respective area.
2. The player who gets the first turn must answer questions from the team leader related to HIV/AIDS. If the answer is correct, the player may place one pawn into the game area. If the answer is wrong, it continues to the next player to answer. The number of squares to be crossed is determined by rolling the dice.
3. Pawns will go back to prison if they meet other pawns or enter the danger zone, namely the zone of dating, smoking, pornography, and drugs.
4. The game lasts for one hour and the winner is the first to reach the final stage.

The list of questions in a question set in the Ludo Healthy Smart Game corresponds to the material prepared in the educational video given to the control group. A 10-minute educational video duration is divided into two parts. The first video discusses the meaning of HIV-AIDS, the epidemiology of HIV-AIDS, the causes of HIV-AIDS, the vertical, horizontal, and transsexual transmission chains of HIV-AIDS, the signs and symptoms of HIV-AIDS, and how to diagnose HIV-AIDS. The second part discusses the impact of HIV-AIDS, HIV-AIDS treatment, HIV-AIDS prevention, and calls for non-stigmatization and non-discrimination of PLWHA.

The questionnaire's questions are also arranged in accordance with the content. Both the experimental and control groups saw an increase in the knowledge and attitudes of adolescents regarding HIV-AIDS following the treatment.

This study measured the change of knowledge levels also the attitudes after they had been given information about HIV-AIDS. At both the pre-test or before treatment and the post-test or after treatment respondents were required to complete the same questionnaire. The questionnaire has been tested to ensure its validity and reliability. The implementation of the research for both the Ludo Healthy Smart Game and video groups was three times with a break of one week from each meeting. The first meeting was held after the pre-test and the last meeting was held before the post-test.

Univariate and bivariate information examinations were performed. Statistical testing software was used to perform non-parametric and parametric statistical analyses on the data. The homogeneity and normality tests were used to test assumptions prior to analysis. This study has been approved and granted the ethical clearance of the number DP.04.03/e-KEPK.1/453/2024.

RESULTS AND DISCUSSION

The adolescents were aged 15-19 years. There was an increase in good knowledge about HIV-AIDS in both groups. The Ludo Healthy Smart Game is effective in improving adolescents' knowledge about HIV-AIDS. However, the Ludo Healthy Smart Game does not affect the attitudes toward HIV-AIDS prevention.

Respondents' Characteristic

Senior high school students in Yogyakarta were the study samples. Table 1 describes the respondents' characteristics regarding age and gender differences.

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Table 1. Respondents' characteristics

Characteristics		Experimental Group		Control Group	
		N	%	n	%
Age	Min	16		15	
	Max	18		17	
	Mean	16.74		16.17	
Gender	Male	21	32.3	26	40
	Female	44	67.7	39	60

The average of age was 16 years old, in both groups. The age ranged from 16 to 18 years for the experimental group and 15 to 17 years for the control group. It was around the age of adolescence. Sixty percent of respondents in the control group and 67.7% of those in the experimental group were female. The World Health Organization (WHO) describe that adolescence between the ages of 10 and 19 is the changing period or transition from a child to and adult. It is a one-of-a-kind period in human development and a crucial time for establishing healthy habits (World Health Organization, 2023a). This definition refers to Minister of Health of the Republic of Indonesia No. 25 of 2014, the age range for adolescents is 10-18 years (Kementerian Kesehatan RI, 2014).

A previous study report that information about period, HIV, and STIs other than HIV expanded strongly with age. Teenagers aged 19 were 6.5 times more likely to be aware of period. Menstruation was understood more by women than by men. Compared to the reference group of under-10-year-olds, adolescents aged 19 were 1.4% more likely to be aware of HIV. Regardless of this, there were no critical distinctions in sexual orientation in information on HIV or STIs other than HIV (Finlay *et al.*, 2020).

This study showed that adolescents between the ages of 10 and 19 are the ideal audience for HIV-AIDS and reproductive health education. Great information on conceptive well-being among youths affects conduct changes connected with HIV/Aids prevention (Obeagu *et al.*, 2023). Adolescents are expected to be mature and knowledgeable about HIV-AIDS by the age of 19.

HIV-AIDS student's knowledge in a good category based on Table 2 was low at 18.5% in the experiment group and 21.5% in the control group. However, after treatment for both groups, the good proportion was increased. In the experimental group before treatment, it was 18.5% to 61.5%. Meanwhile, in the control group before treatment, it was 21.5% to 72.3%. Z score showed that it increased 6.339 for Ludo and 5.779 for video.

A previous study in Yogyakarta found only 18.5% of a good level of knowledge about reproductive health among students in Yogyakarta (Retno et al., 2015). Another study in 2022 found that 90.1% of adolescents had ever heard or known about HIV-AIDS and only 9.9% knew what HIV-AIDS was. Another fact was adolescents reported that they didn't really understand about HIV-AIDS (Justus, 2022).

Adolescents' knowledge about HIV-AIDS was obtained through a series of questions. It was found that there were respondents who answered incorrectly when assessing their knowledge about signs and symptoms of HIV-AIDS, chain of transmission of HIV-AIDS, and prevention of HIV-AIDS. The majority of respondents, 84%, did not correctly answer questions about HIV-AIDS symptoms. Approximately 47% of respondents also believed that People Living with HIV (PLHIV) who have not yet shown symptoms would not infect others.

Table 2. Knowledge level and attitudes toward HIV-AIDS prevention among adolescents

Variables			Experimental Group		Control Group	
			n=65	%	n=65	%
Knowledge level of HIV-AIDS prevention	Pre-test	Poor	10	15.4	7	10.8
		Sufficient	43	66.2	44	67.7
		Good	12	18.5	14	21.5
	Post-test	Poor	2	3.1	6	9.2
		Sufficient	23	35.4	12	18.5
		Good	40	61.5	47	72.3

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Attitudes toward HIV-AIDS prevention	Pre-test	Mean	71.74	73.58
		Minimum	42	51
		Maximum	92	89
	Post-test	Mean	72.54	74.40
		Minimum	57	56
			93	96

HIV primarily targets the immune system of the human body within 24 to 48 hours of HIV's entry into the human body to regional lymph nodes. The viral is detected in 5 to 10 days in the peripheral blood. HIV symptoms do not manifest immediately during this time. The asymptomatic phase lasts an average of eight years worldwide. However, the infection can still be spread by PLHIV (Taisheng Li, 2022). However, another study (Kawuki *et al.*, 2023) found that 82% of adolescents were aware that a healthy-looking person also could have HIV. HIV infection's clinical outcomes are largely influenced by viral factors, also host immune status, and genetic background.

In addition, not all respondents answered correctly about the horizontal and vertical chains of transmission of HIV-AIDS, with 77% of respondents answering incorrectly. Adolescents need to know about the transmission chain of HIV-AIDS in order to be able to avoid risky behaviors that increase the risk of HIV-AIDS. HIV-AIDS is also transmitted from mother to child. A 2023 literature study states that a lack of knowledge among adolescents is a factor that leads adolescents to engage in unsafe sexual relations and other risky behaviors such as premarital sex.

Premarital sex has an impact on other reproductive health issues for adolescents, including pregnancy, abortion, sexually transmitted infections (STIs), HIV-AIDS, regrets, guilt, loss of self-respect, depression, a lack of support from family, substance abuse, and even suicide (Shrestha, 2019).

Some respondents, 52%, still correctly answered the statement that one way to prevent HIV-AIDS is to stay away from those infected. HIV transmission occurs through sexual contact, blood or blood product, and mother-to-child. It cannot be transmitted by mosquito bites, food sharing, or physical contact (Arifin *et al.*, 2022).

An absence of HIV information can prompt confusions, particularly in regard to the HIV transmission chain bringing about pessimistic perspectives toward individuals living with HIV/AIDS (PLWHA). People who had more knowledge about HIV were less likely to hold stigmatizing attitudes (Arifin *et al.*, 2022).

The post-treatment increase for both groups can also be seen in the adolescents' attitudes based on Table 2. The average score of adolescents' attitudes toward HIV-AIDS prevention in the experimental group was 71.74 to 72.54 after receiving information about HIV-AIDS through the Ludo Healthy Smart Game. In the control group, the average score of adolescents' attitudes toward HIV-AIDS prevention was 73.58 to 74.40 after receiving information about HIV-AIDS using video education. Adolescents' attitudes were measured by presenting respondents with a statement that included cognitive, affective, and conative attitude domains based on Benyamin Bloom's theory. Cognitive refers to individual beliefs, ideas, concepts, and stereotypes about HIV-AIDS. Affective is a personal feeling and related to emotions about HIV-AIDS prevention. The tendency to act toward HIV-AIDS prevention is addressed in the conative domain (Abd Nashir, Abdul Muthih, 2014).

The Correlation of the Ludo Healthy Smart Game on Knowledge Levels and Attitudes toward HIV-AIDS among Adolescents

Statistical data analysis by the Wilcoxon test was used to investigate how the Ludo Healthy Smart Game affected knowledge. In the attitude category with normal data distribution, it was tested with a paired sample t-test. Tables 3 and 4 contain the statistical data analysis.

Table 3. Effect of the Ludo Healthy Smart Game and video education about HIV-AIDS on knowledge levels about HIV-AIDS

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Variables		Z-score	p-value
Experimental group	Pre-test Post-test	6.399	0.000
Control group	Pre-test Post-test	5.779	0.000

The Ludo Healthy Smart Game has an impact on adolescents' knowledge of HIV-AIDS with a p-value of 0.000. The Ludo Healthy Smart Game has been proven to improve the adolescents' knowledge about HIV-AIDS. Another study on the use of the Snakes and Ladders game also showed that there was an increase in knowledge about HIV-AIDS before, and after treatment with a value of p=0.000 (Thaha *et al.*, 2023). Health promotion media using games are considered attractive because they are efficient, modern, and more interactive. Gaming provides unique learning experiences for adolescents to improve their learning outcomes. The ludo game as a health promotion medium is packaged with a variety of pictures, questions, and answers that make it easier for adolescents to learn about HIV-AIDS and allow for discussions among friends. Games as a health promotion media are an appropriate health education solution. They can be used at any time and in the absence of a health educator.

A study by Pendergrass et al. found that video game-style edutainment had an influence on knowledge about HIV-AIDS and intentions to carry out HIV testing and counseling (Boomer *et al.*, 2024). According to the study, a previous study found that men who did not have comprehensive HIV-AIDS knowledge were less likely to test positive for HIV than men who did. Adolescents with good knowledge will be aware of their self-regarding to HIIV transmission. HIV testing is crucial for those who are at risk of HIV-AIDS. Approximately 90% of people who know their status have access to antiretroviral therapy (Tetteh *et al.*, 2022). Good knowledge of HIV-AIDS leads to positive behavioral attitudes, which in turn reduce the risk of death and infection.

Video education in this study also had an impact on improving adolescents' knowledge about HIV-AIDS with a p-value of 0.000. This study is in line with a previous study that stated that video education significantly affects adolescents' knowledge about HIV-AIDS and stigma toward PLWHA. The use of video is more effective than printed media (Setiyawati and Meilani, 2020). An element that assumes a basic part in the growing experience is the development of media. An audio-visual educational medium is video. Audiovisual media education can express an event and an object in their true state by simultaneously displaying images and sounds when communicating messages or information. It is considered more interesting and understandable because the use of these media can make adolescents hear, see, and pay close attention to what is displayed thereby increasing the reception of information by the brain. Recent research has shown that animated educational videos contain creative, in-depth, and comprehensive information that influences adolescents' knowledge of anemia. To increase knowledge, a 10-minute educational video was used (Aisah, Ismail and Margawati, 2022).

Table 4. Effect of the Ludo Healthy Smart Game and video education about HIV-AIDS on attitudes toward HIV-AIDS prevention

Variables		t-score	p-value
Experimental group	Pre-test Post-test	0.732	0.467
Control group	Pre-test Post-test	0.754	0.454

Adolescent attitudes toward HIV-AIDS prevention were unaffected by the Ludo Healthy Smart Game in the experimental group and by the videos in the control group, as shown in Table 4. With a p-value greater than 0.05, neither the Ludo Healthy Smart Game nor the videos have been shown to improve adolescents' attitudes. A similar study of the use of mobile game-based education revealed that mobile games helped adolescents learn more about HIV-AIDS. Be that as it may, there was no impact on youths' mentalities. The fact that the game treatment was carried out in a single session and that the study had a relatively small sample may suggest that attitudes did not significantly shift before or after the treatment (Tang *et al.*, 2022).

Realizing an item contains two viewpoints, to be specific the positive

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perspectives and the negative viewpoints. a person's attitude is determined by these two factors. Assuming the more certain parts of an item are known, the more positive aspects of an object are known, the more positive attitudes will made (Badru *et al.*, 2020).

This suggests that the effort to improve knowledge through the use of the Ludo Healthy Smart Game is still important in strengthening adolescents' knowledge about HIV-AIDS. It is trusted that having adequate information will assist with making inspirational perspectives toward HIV-AIDS among adolescents. The higher the level of knowledge, the more positive the attitude of a person toward HIV-AIDS prevention (Bor *et al.*, 2021).

There are two aspects to knowing an object: the positive aspects and the negative aspects. A person's attitude is determined by these two factors. According to Badru et al. (2020), more positive attitudes will be formed when more positive aspects of an object are known. This suggests that the Ludo Healthy Smart Game's efforts to expand adolescents' understanding of HIV-AIDS continue to be significant. It is trusted that having adequate information will assist with making uplifting outlooks towards HIV-AIDS anticipation among adolescents. A person's attitude toward HIV-AIDS prevention will be more upbeat the higher their level of knowledge (Bor *et al.*, 2021).

A previous study conducted on students at Mataram High School 2 found that the knowledge level was related to HIV-AIDS prevention behavior among adolescents. Similar results were also found in a study conducted in some high schools in Purbalingga, Denpasar, and Palopo. Knowledge becomes a stimulus. It causes a response that forms good behavior (Ulandari *et al.*, 2023). Benyamin Bloom's theory of educational psychology states that the cognitive aspect or knowledge of adolescents is the most dominant aspect that will influence their ability to think and act. Good knowledge is expected to lead to good behavior (Lafendry, 2023).

Negative stigma toward people living with HIV-AIDS (PLWHA) still exists in Indonesia. Negative stigma towards PLWHA has a negative impact on PLWHA in terms of treatment refusal and social withdrawal. Lack of knowledge about HIV-AIDS is the main cause of this negative stigma. This shows that there is also a need for the public to have a good knowledge of HIV-AIDS. In addition to preventing new HIV-AIDS infections in the community by implementing HIV-AIDS prevention, good knowledge is needed to reduce negative stigma as a form of support for PLWHA in undergoing treatment and preventing transmission to others in order to reduce the death rate from HIV-AIDS (Fauk *et al.*, 2021).

Ludo is also an edutainment for adolescents and the peer strategy because this game consists of 3-4 people as a peer group. Previous study showed that peer education to avoid drug abuse effectively improves self-efficacy, self-esteem, and skill and also controls behavior challenges among adolescents (Nurmala *et al.*, 2024).

CONCLUSION

The Ludo Healthy Smart Game improves adolescents' understanding of HIV-AIDS. Positive attitudes toward HIV-AIDS prevention are unaffected by the Ludo Healthy Smart Game. Despite this, treatment resulted in a difference in mean and an increase in adolescents' knowledge and attitudes. The Ludo Healthy Smart Game is a health education tool that can be used to educate adolescents about HIV-AIDS. Adolescents' attitudes toward HIV-AIDS prevention improve with their knowledge of the disease. An in-depth investigation into the Ludo Healthy Smart Game's impact on positive attitudes toward HIV-AIDS prevention can be conducted using our findings as a reference for future research development and improvement.

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