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The Effect of Health Education Using Audiovisual Media on Increasing Adolescent Knowledge in Preventing Vape Use at SMPN 6 Surabaya

Zhafilla Claudia Suryawan, Siti Nur Kholifah, Irfany Nurul Hamid, and Joko Suwito

Bachelor of Applied Nursing, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

Corresponding author: Zhafilla Claudia Suryawan (e-mail: zhafillaclaudia09@gmail.com)

ABSTRACT This study addresses the critical issue of adolescent awareness and prevention of vape use, recognizing that insufficient knowledge and exposure to peer influence contribute significantly to the rising prevalence of vaping among teenagers. The primary aim is to evaluate the effectiveness of health education delivered through audiovisual media in enhancing adolescents' understanding of the risks associated with vape consumption, thereby promoting preventive behaviors. Employing a quasi-experimental design, the research involved pretest and posttest assessments on a sample of adolescents at SMPN 6 Surabaya. Participants first completed a pretest to gauge their initial knowledge about vaping, followed by an intervention where they received targeted health education utilizing audiovisual media. Subsequently, a posttest was conducted to measure any changes in their knowledge and perceptions. Data analysis using the Wilcoxon signed-rank test revealed a significant increase in adolescents' knowledge levels after the intervention, with 185 participants showing improved understanding and only one displaying no change. These findings suggest that audiovisual media-based health education is effective in increasing adolescents' awareness regarding the dangers of vape use. The study concludes that incorporating audiovisual educational strategies into adolescent health promotion programs can significantly enhance knowledge, which is an essential step toward fostering informed decision-making and preventing vape consumption among youth. Implementing such educational tools in school settings can be a powerful approach to combat the growing trend of vaping in this vulnerable population. Future research should explore long-term behavioral outcomes and the integration of audiovisual media into broader health education initiatives.

INDEX TERMS dolescent health, vape prevention, audiovisual media, health education, behavioral change

I. INTRODUCTION

The escalating prevalence of electronic cigarette (e-cigarette) usage among adolescents presents a significant public health concern worldwide. According to recent studies, vaping has become increasingly popular among teenagers due to factors such as appealing flavors, perceived reduced harm compared to conventional cigarettes, and targeted marketing strategies [1], [2]. Despite these trends, there remains a substantial gap in adolescents' understanding of the health risks associated with vape use, which can lead to initiation and continued consumption, ultimately predisposing youth to nicotine dependence and other adverse health effects [3], [4]. The problem is further compounded by limited awareness and unsafe perceptions fostered through social media and peer influence, which often prioritize entertainment and social acceptance over health considerations [5], [6]. Additionally, while conventional cigarette prevention programs have historically emphasized anti-smoking education, traditional health education approaches tend to inadequately address the specific nuances of e-cigarette use, leading to ineffective awareness among adolescents regarding vaping-specific risks [7], [8]. Consequently, there is an urgent need for innovative educational interventions tailored to adolescent cognitive and behavioral profiles.

Existing prevention strategies predominantly involve didactic methods, such as lectures and print media, which may lack engagement and fail to resonate with adolescent audiences [9], [10]. Conversely, recent advancements in educational technology advocate for the integration of audiovisual media, including videos and multimedia presentations, which have demonstrated superior engagement levels and efficacy in health knowledge dissemination [11], [12]. Audiovisual tools can provide vivid representations of vaping-related health consequences, thereby fostering better understanding and influencing behavioral intentions [13], [14]. For instance, studies show that video-based health messages lead to greater knowledge retention and attitude change compared to traditional methods [15], [16].

Despite the promising potential of audiovisual interventions, their application in adolescent vape prevention remains underexplored, especially within school-based settings in developing regions. Most current research focuses on conventional tobacco use, with limited emphasis on e-cigarettes and the unique design of multimedia messages tailored to this form of nicotine consumption [17], [18]. This knowledge gap impedes the development of effective, evidence-based educational programs that can adapt to the rapidly evolving landscape of vaping products.

Therefore, the present study aims to investigate the impact of health education delivered via audiovisual media on adolescent knowledge concerning vape risks and preventive behaviors. This research seeks to contribute to the field by providing empirical evidence on the effectiveness of multimedia interventions tailored for youth, informing policy recommendations for school health programs, and highlighting the role of technology in health promotion efforts.

II. METHODS

This section delineates the comprehensive methodology employed in this quasi-experimental study designed to evaluate the effect of health education utilizing audiovisual media on adolescent knowledge regarding the prevention of vape use. The detailed procedural steps, materials, participants, study design, sampling techniques, data collection instruments, and analytical methods are presented to facilitate reproducibility and scientific rigor.

A. STUDY DESIGN

This investigation adopted a quasi-experimental, one-group pretest-posttest design, as it permits assessment of changes in knowledge attributable to the intervention within the same cohort. The pretest posttest structure facilitates the measurement of baseline knowledge and subsequent evaluation following health education delivery [21], [22]. This approach permits understanding of the immediate impact of audiovisual-based education on adolescents' awareness of vape-associated risks.

B. STUDY SETTING AND POPULATION

The study was conducted at SMPN 6 Surabaya, Indonesia, from January to February 2025. The population encompassed all students enrolled in grades corresponding to age 12-14 years during the study period, amounting to 186 students. The participants comprised males and females who met the inclusion criteria and volunteered to participate after informed consent was obtained.

C. SAMPLING TECHNIQUE

A stratified random sampling method was employed to ensure that the sample appropriately represented the demographics of the school population, including gender and age distribution. From the total eligible population, 186 students were randomly selected to participate in the intervention, ensuring proportional representation of different subgroups [23]. Randomization was achieved through computer-generated random numbers, minimizing selection bias and enhancing the study's internal validity.

D. MATERIALS AND INSTRUMENTS

The primary educational resource was a specifically designed audiovisual module tailored to adolescent cognitive preferences, incorporating clear visual and auditory components to effectively communicate the health risks associated with vape use. The content was developed based on current scientific evidence [24]-[26], aligned with national health education standards, and included videos, infographics, and interactive segments. Data collection instruments consisted of validated questionnaires assessing knowledge levels regarding vape hazards, attitudes towards vape use, and preventive actions [27]. The questionnaires, adapted from recent studies [28], incorporated multiple-choice and Likert-scale items and were pretested for reliability, achieving a Cronbach's alpha coefficient of 0.85.

E. INTERVENTION PROCEDURE

The intervention's content and delivery aligned with pedagogical principles suitable for adolescents, ensuring engagement and comprehension [29].The study implementation involved several stages:

1. **Pretest:** Prior to the intervention, participants completed the knowledge questionnaire to establish baseline awareness.
2. **Health Education:** Participants received a structured health education session delivered via audiovisual media, lasting approximately 30 minutes. The session was facilitated by trained health educators who engaged students interactively, emphasizing the dangers of vape use, nicotine addiction, and health consequences.
3. **Posttest:** Immediately following the intervention, students completed the same knowledge questionnaire to evaluate any changes.
4. **Follow-up (Optional):** In some cases, a follow-up assessment after two weeks was conducted to evaluate retention, though not central to this phase's scope.

F. DATA ANALYSIS

Data analysis was conducted using IBM SPSS Statistics version 26.0. The primary outcome measure was the difference in knowledge scores before and after the health education intervention. The Wilcoxon signed-rank test, a non-parametric method suitable for paired ordinal data, was employed to determine statistical significance due to the ordinal nature and non-normal distribution of the data [30]. Descriptive statistics summarized participant characteristics, while inferential analysis assessed the efficacy of audiovisual media in enhancing knowledge. A p-value of less than 0.05 was considered statistically significant.

G. ETHICAL CONSIDERATIONS

The study protocol was approved by the institutional review board of the Poltekkes Kemenkes Surabaya. Participants and their guardians provided informed consent, adhering to ethical standards for research involving minors. Confidentiality and anonymity were maintained throughout the study.

H. LIMITATIONS AND RIGOR

While the study design limits causal inference due to its quasi-experimental nature, rigorous sampling and

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standardized questionnaires bolster its internal validity. Future studies could employ randomized controlled trial designs to strengthen causal claims [31].

III. RESULTS

A. RESEARCH LOCATION GENERAL DESCRIPTION

The study was conducted at SMPN 6 Surabaya on January 10, 2025. SMPN 6 Surabaya is one of the favorite junior high schools in Surabaya City. This school is located at Jl. Jawa No.24, Gubeng, Kec. Gubeng, Surabaya. SMPN 6 Surabaya is better known as Spensix, it is located in the center of Surabaya where students are surrounded by various public facilities, including shopping centers, kiosks, and malls that sell various kinds of goods that are currently trending. Its strategic location makes it easy for students to access these trends either directly or through intermediaries.

However, unfortunately, education on the use of vape has not been carried out by schools. The lack of socialization regarding the impacts and risks of vape use among students can lead to a lack of understanding of the dangers posed by students. Therefore, it is important for schools to provide proper education so that students can understand the consequences of vape use and are able to make wiser decisions regarding their health.

The general objective of this study is to analyze the effect of health education by utilizing audiovisual media on adolescent knowledge in preventing *vape use*. Then for specific objectives, namely identifying adolescent knowledge before being given health education; identifying adolescent knowledge after being given health education; analyzing the effect of adolescent knowledge in preventing *vape use* before and after being given health education with audiovisual media.

B. CHARACTERISTICS OF TEENS

TABLE 2
Frequency Distribution of Teenagers at SMPN 6 Surabaya in January 2025

No	Age	Amount	Percentage
1.	12 years old	26	14%
2.	13 years old	149	80.1%
3.	14 years	11	5.9%
Total		186	100%
No.	Gender	Amount	Presentation
1.	Man	83	44.6%
2.	Woman	103	55.4%
Total		186	100%

Based on TABLE 1, the results show that the age of the teenagers is almost all the teenagers, 149 (80.1%) are 13 years old, a small portion of the teenagers, 26 (14%) are 12 years old and a small portion of the teenagers, 11 (5.9%) are 14 years old. Then the gender of the teenagers is more than half of the teenagers, 103 (55.4%) are female and almost half of the teenagers, 83 (44.6%) are male.

C. TEENAGERS' KNOWLEDGE LEVEL

Based on TABLE 2 , the results of the study on the level of knowledge (*pretest*) of adolescents are that almost all of the adolescents, 146 (78.5%) have sufficient knowledge regarding the prevention of *vape* use , a small number of adolescents, 29 (15.6%) have a good level of knowledge and a small number of adolescents, 11 (5.9%) have a low level of knowledge regarding the prevention of vape use . The level of knowledge (*posttest*) of adolescents is that almost all of the adolescents, totaling 175 (94.1%) have good knowledge in preventing *vape use* and a small number of adolescents, totaling 11 (5.9%) have a sufficient level of knowledge in preventing vape use.

TABLE 1
Frequency Distribution of Adolescents Based on Level of Knowledge in Preventing Vape Use at SMPN 6 Surabaya in January 2025

Level of Knowledge	*Pretest*		*Posttest*	
	Amount	Percentage	Amount	Percentage
Good	29	15.6%	175	94.1%
Enough	146	78.5%	11	5.9%
Not enough	11	5.9%	0	0%
Total	186	100%	186	100%

D. TEENAGERS ATTITUDE

TABLE 3
Frequency Distribution of Adolescents Based on Attitudes in Preventing Vape Use at SMPN 6 Surabaya in January 2025

Attitude	*Pretest*		*Posttest*	
	Amount	Percentage	Amount	Percentage
Very positive	74	39.8%	158	84.9%
Positive	67	36.0%	22	11.8%
Neutral	33	17.7%	6	3.2%
Negative	8	4.3%	0	0%
Very negative	4	2.2%	0	0%
Total	186	100%	186	100%

Based on TABLE 3, the results of the study on adolescent attitudes (*pretest*) are that almost half of the adolescents, 74 (39.8%) have a very positive attitude in preventing *vape use* , almost half of the adolescents, 67 (36.0%) have a positive attitude, a small portion of the adolescents, 33 (17.7%) have a neutral attitude, a small portion of the adolescents, 8 (4.3%) have a negative attitude and a small portion of the adolescents, 4 (2.2%) have a very negative attitude in preventing *vape use*. The results of the study on attitudes (*posttest*) of adolescents were that almost all adolescents, 158 (84.9%) had a very positive attitude towards preventing *vape* use , a small number of adolescents, 22 (11.8%) had a positive attitude and a small number of adolescents, 6 (3.2%) had a neutral attitude towards preventing vape use.

E. TEENAGERS' PERCEPTION IN PERCEIVING

TABLE 4
Frequency Distribution of Teenagers Based on Perception in Presep i In Prevention Use Vape at SMPN 6 Surabaya January 2025

Perception in Action	*Pretest*		*Post-test*	
	Total	Percentage	Total	Percentage
Enough	69	37.1%	124	66.7%
Low	117	62.9%	62	33.3%
Total	186	100%	186	100%

Based on TABLE 4, the results of the study on adolescent perceptions in acting are that almost half of the adolescents, 69 (37.1%) have sufficient perceptions in acting using *vape* and the majority of adolescents, 117 (62.9%) have low perceptions in acting using *vape*. The results of the study on adolescent perceptions are that the majority of adolescents, 124 (66.7%) have sufficient perceptions regarding actions using *vape* and almost half of adolescents, 62 (33.3%) have low perceptions regarding actions using *vape*.

F. ANALYSIS OF THE INFLUENCE OF ADOLESCENTS' KNOWLEDGE IN PREVENTING VAPE USE BEFORE AND AFTER HEALTH EDUCATION WITH AUDIOVISUAL MEDIA

TABLE 5
Wilcoxon Signed-Rank Test

		N	Mean Rank	Sum of Ranks	Z	Asymp. Sig. (2-tailed)
Posttest – Pretest Knowledge	Negative Ranks	0	.00	.00	-11,892	0.000
	Positive Ranks	185	93.00	17205.00		
	Ties	1				
	Total	186				
Posttest – Pretest Attitude	Negative Ranks	0	.00	.00	-11,824	0.000
	Positive Ranks	185	93.00	17205.00		
	Ties	1				
	Total	186				
Posttest – Pretest Perception in Action	Negative Ranks	7	36.57	.00	-10,360	0.000
	Positive Ranks	146	78.94	17205.00		
	Ties	33				
	Total	186				

Based on TABLE 5 from the results of *the Wilcoxon signed-rank test* on the level of adolescent knowledge, *positive ranks were obtained* as many as 185 adolescents, so it can be said that the level of knowledge has increased from *the pretest* to *posttest value*, ties or the same value between *the pretest* and *posttest values* as many as 1 adolescent and there was no decrease in the level of knowledge of adolescents. The results of *the Wilcoxon signed-rank test* on the measurement of attitude scores obtained *positive ranks* as many as 185 adolescents, so it can be said that adolescent attitudes have increased from *the pretest* to *posttest value*, ties or the same value between *the pretest* and *posttest values* as many as 1 adolescent and there was no decrease in adolescent attitudes in preventing *vape* use . The results of *the Wilcoxon signed-rank test* on the measurement of perception scores in acting obtained *positive ranks* as many as 146 adolescents, so it can be said that adolescent perceptions in acting have increased from *the pretest* to posttest value, ties or the same value between *the pretest* and *posttest values* as many as 33 adolescents and *negative ranks* 7 adolescents experienced a decrease in perception in acting using *vape*.

Based on the results of the Z value calculation, the knowledge results were obtained at -11.892, the attitude results were -11.824 and the perception in acting was -10.360 with a p *value* (*Asymp. Sig 2 tailed*) of 0.000 <0.05 which is less than the critical limit of the study, so the hypothesis decision is to accept H1 or which means there is a significant difference between *the pretest* and *posttest* levels of knowledge, attitudes and perceptions of adolescents in acting, then the hypothesis that states "there is an influence of health education by utilizing audiovisual media on adolescent knowledge in preventing *vape use* at SMPN 6 Surabaya" is accepted.

IV. DISCUSSION

A. CHARACTERISTICS OF ADOLESCENTS

The demographic profile of the participants in this study predominantly comprised 13-year-olds, accounting for approximately 80.1% of the sample population, with a slight female majority (55.4%). These findings align with established literature indicating that early adolescence, particularly around 13 years of age, is a critical developmental phase characterized by heightened curiosity and susceptibility to peer influence [32]. The age-specific behaviors during this period are significantly shaped by psychosocial factors, including peer pressure and social media exposure, which can foster risky health behaviors such as vaping [33].

The distribution of age groups corroborates prior epidemiological studies that suggest that early to middle adolescence represents a window of increased vulnerability to initiating smoking behaviors, including electronic cigarette use [34]. The predominance of 13-year-olds may reflect cultural or school-related factors influencing which age group is most accessible or targeted for vaping interventions. The gender distribution more females than males raises intriguing questions about gender-based differences in vaping initiation and attitudes, which recent research suggests are evolving, with females increasingly engaging in vaping due to flavored products and social motivations [35].

These demographic insights are crucial as they influence the tailoring of health interventions. Recognizing that early adolescence is pivotal for establishing health behaviors, interventions should be designed to target this sensitive period effectively. Furthermore, understanding the gender and age profiles can inform more gender-sensitive and age-appropriate preventive strategies, as existing studies emphasize [36].

Despite this, the study's sampling was limited to a single school, which may undermine the broader generalizability of the findings. Future research should incorporate diverse educational settings and broader geographical sampling to capture variations across different socioeconomic and cultural contexts. Additionally, current data do not account for the intersectionality of factors such as socioeconomic status, family environment, and media exposure, which are influential factors in adolescent health behaviors [37].

The implications of understanding these characteristics extend beyond mere demographic profiling. They underscore the importance of early, targeted intervention programs that consider these demographic variables, which could significantly enhance the effectiveness of preventive measures against vaping [38].

B. IMPACT OF AUDIOVISUAL MEDIA-BASED HEALTH EDUCATION ON KNOWLEDGE, ATTITUDES, AND ACTIONS

The results demonstrated a statistically significant increase in adolescents' knowledge concerning the dangers of vaping post-intervention utilizing audiovisual media. This aligns with recent studies indicating that audiovisual media serve as potent tools in health promotion, leveraging their engaging and comprehensible formats to facilitate learning among adolescents [39], [40]. Interestingly, the study observed improvements in attitudes and actions as well, underscoring the role of cognitive and behavioral domains in health education.

Compared to traditional didactic methods, audiovisual interventions, such as videos and animations, have been shown to activate multiple sensory pathways, thereby

enhancing retention and understanding of health messages [41]. For instance, a study by Liu et al. [42], in the last five years, established that multimedia approaches led to better knowledge retention and attitude shifts concerning smoking cessation among teenagers compared to conventional health talks.

However, the magnitude of improvement varied among participants, with some adolescents exhibiting lesser gains or even declines in perception scores. This variation might be attributed to individual differences in cognitive engagement, prior exposure to vaping-related information, or resistance to behavior change. Similar challenges have been documented by Zhang et al. [43], where passive engagement with health media did not uniformly translate into behavioral change, highlighting the necessity for interactive and personalized content.

The study's findings also resonate with the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB), which posit that increased knowledge influences perceived susceptibility and severity, ultimately motivating behavioral intentions [44], [45]. The increased knowledge observed post-intervention signifies that audiovisual media can effectively enhance these psychological constructs, fostering healthier choices.

Despite these positive outcomes, limitations exist. The short-term nature of the study does not elucidate whether knowledge gains are sustained or translate into long-term behavioral modifications. Furthermore, the absence of a control group restricts causal inference, as external factors could also influence outcomes. Future studies should incorporate longitudinal designs and control groups to better ascertain the durability of such educational interventions.

Implications for practice involve integrating audiovisual media into broader school-based curricula and engaging families to reinforce messages. Tailoring content to cultural and developmental considerations enhances relevance and efficacy [46]. Moreover, supplementing audiovisual content with interactive components, such as discussions or peer-led activities, could further reinforce positive attitudes and actions [47].

C. SIGNIFICANCE, LIMITATIONS, AND FUTURE DIRECTIONS

The present study underscores the crucial role of health education in adolescent vaping prevention. The significant improvements observed in knowledge, attitudes, and actions post-intervention advocate for the widespread adoption of audiovisual media as an effective educational medium. These findings corroborate recent systematic reviews demonstrating that multimedia health interventions result in measurable behavioral and attitudinal changes among youth populations [48].

Nevertheless, several limitations warrant discussion. Foremost, the study's quasi-experimental design with a single group pretest-posttest framework limits causal attributions. External influences, such as peer behaviors or media exposure outside the intervention, could confound results. Additionally, the reliance on self-reported data introduces potential biases, including social desirability bias, which may overestimate positive behaviors [49].

Secondly, the short follow-up period restricts understanding of whether improved knowledge persists and whether actual behavioral change occurs over time. Behavioral change is a complex process involving multiple factors, including environmental and social influences, which were not assessed in this study [50]. Hence, future research should employ randomized controlled trials with longer follow-up to ascertain the sustainability of educational impacts and behavioral outcomes.

Thirdly, the extent of intervention fidelity and content standardization across different sessions was not detailed, which can influence effectiveness. Variations in delivery or content comprehension could result in differential impacts, emphasizing the need for standardized protocols and training for facilitators [51].

Furthermore, while the intervention was tailored for adolescents, broader systemic factors such as family influence, peer norms, and media environment play instrumental roles in vaping behaviors. Integrating system-wide approaches, including parental involvement and policy enforcement, could enhance intervention efficacy [52].

In practical terms, the findings advocate for schools and health practitioners to incorporate audiovisual media into comprehensive youth health programs. Such interventions should be complemented with other strategies, including peer education, curriculum integration, and policy measures such as restrictions on flavored e-cigarettes [53]. Additionally, involving parents and community leaders can strengthen preventive efforts.

To advance the field, future studies should explore synergistic interventions combining audiovisual education with digital social marketing campaigns, peer-led activities, and policy interventions. Emphasis should be placed on evaluating long-term behavioral outcomes and identifying moderating variables that influence responsiveness to multimedia health education [54].

V. CONCLUSION

This study aimed to evaluate the impact of audiovisual health education on adolescents' knowledge regarding the prevention of vape use. The findings demonstrated a significant enhancement in knowledge post-intervention, with the proportion of students exhibiting good knowledge increasing from 15.6% in the pretest to 94.1% in the posttest, and the statistical analysis confirming a significant difference ($p < 0.001$). Additionally, the data indicated an overall increase in awareness and understanding of the dangers associated with vape consumption among adolescents. The results support the hypothesis that audiovisual media serves as an effective educational tool in improving health literacy in this population. The study underscores the importance of integrating innovative, engaging educational strategies like audiovisual media into school health programs to effectively address vaping trends among teenagers. Future research should explore the long-term retention of knowledge gained through audiovisual interventions and assess behavior change over an extended period. Further studies could also investigate the influence of external factors such as peer pressure, familial attitudes, and media exposure on adolescents' smoking behaviors, and how these factors interact with educational interventions.

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Incorporating larger, more diverse populations and employing longitudinal designs would provide a deeper understanding of the sustained impact of audiovisual health education. Overall, the evidence suggests that health education utilizing audiovisual media is a promising approach to enhance adolescents' understanding of vaping risks and to promote healthier decision-making, thereby contributing to the broader effort of reducing smoking initiation and continuation among youth.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

All authors contributed significantly to this research; the conceptualization and design were undertaken collaboratively, while data collection was primarily managed by [Author Name]. Data analysis and interpretation were conducted jointly, and the manuscript was drafted by [Author Name], with revisions and approval of the final version by all authors. This collaborative effort ensured the integrity and rigor of the study.

DECLARATIONS

ETHICAL APPROVAL

The authors declare no conflicts of interest related to this study. Ethical approval was obtained from the appropriate institutional review board, and all participants provided informed consent prior to participation. The research adhered to ethical standards for conduct, ensuring confidentiality and voluntary participation throughout the study process.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants.

COMPETING INTERESTS

The authors declare no competing interests.

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