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2 **The Effectiveness of Digital Media in Improving Adolescent Health Literacy about the Dangers of Smoking: Literature Review**Isah Fitriani<sup>1\*</sup>, Sitti Nur Djannah<sup>2</sup>, Heni Trisnowati<sup>3</sup><sup>1</sup>Magister of Public Health, Ahmad Dahlan University, | [2307053018@webmail.uad.ac.id](mailto:2307053018@webmail.uad.ac.id)<sup>2</sup>Faculty of Public Health, Ahmad Dahlan University | [sitti.nurdjannah@ikm.uad.ac.id](mailto:sitti.nurdjannah@ikm.uad.ac.id)<sup>3</sup>Faculty of Public Health, Ahmad Dahlan University | [heni.trisnowati@pascakesmas.uad.ac.id](mailto:heni.trisnowati@pascakesmas.uad.ac.id)\* Corresponding Author: [2307053018@webmail.uad.ac.id](mailto:2307053018@webmail.uad.ac.id)**ABSTRACT**

**Introduction:** The prevalence of smoking in adolescents is still relatively high both in the world and in Indonesia. Not only teenage boys, but adolescent girls also consume cigarettes. The 2022 National Socio-Economic Survey noted that 37.49% of children at that age smoked more than 60 cigarettes every week. In fact, adolescent health is a long-term investment that needs to be considered considering its urgency as the nation's next generation. In this case, the emergence of technology has the potential to provide measurable innovative interventions in tobacco control through health promotion media.

**Objective:** This study aims to explore articles that discuss the effectiveness of digital media in increasing health literacy, the dangers of smoking in adolescents seen from the variables that have changed.

**Method:** The method used is a literature review by analyzing articles relevant to the research topic with a publication range of 2019-2024. The databases used are PubMed, DOAJ, and Google scholar with the keywords "digital media", "literacy", "cigarettes" and "adolescents". The researcher found 504 articles and included them into 8 relevant articles.

**Result:** Eight articles show that audiovisual-based digital media is claimed to be very effective for use in health promotion. The ability to analyze good health messages is reflected in changes in higher levels of knowledge, attitudes, motivations, intentions, and behaviors. Thus, there are indications that there is an increase in health literacy in adolescents about the dangers of cigarettes (p value<0.05) is increasing. Effectiveness was measured using pre-test, post-test, survey, and interview before and after being given an intervention using digital media that had been prepared.

**Conclusion:** Digitalization is the gateway to increasing the existence of health promotion in a more practical and modern way. With a high level of literacy, adolescents' knowledge, attitudes, and motivation are expected to increase so that it will have implications for healthy living behavior.

**Keywords:** Digital Media; Literacy; Cigarettes; Adolescents

## INTRODUCTION

Cigarettes are still a significant global health problem. Efforts continue to be intensified by various parties to reduce the prevalence of smoking. However, nicotine addiction, marketing strategies carried out by the tobacco industry, and cultural acceptance are challenges in themselves. The emergence of technology has the potential to provide measurable innovative interventions to control tobacco (1). Health literacy is one of the alternative solutions because it contains individual cognitive and social skills related to access, understanding, and the use of information to protect health as expressed by WHO. Reading, numerical skills, and communication skills (both verbal and written) are important attributes in health literacy (2).

Based on data from the Indonesian Child Profile in 2023, the prevalence of smoking in children aged 5-17 years has experienced a stagnant trend since 2021-2022, which is 1.51%. Meanwhile, the 2022 National Socio-Economic Survey noted that 37.49% of children at this age smoked more than 60 cigarettes every week. This percentage is higher than the previous year, which was only 34.88%. Still in the same survey, the percentage of female smokers aged 5-17 years reached 0.14% in rural areas, double the percentage in urban areas. However, this increase indicates the presence of addictive smoking behaviors even though the trend of cases is stagnant (3). The U.S. Food and Drug Administration found that teens are aware that e-cigarettes can be addictive, but they are not worried about the dangers behind them (6).

The phenomenon of adolescent smokers can be influenced from inside and outside the self (environment), such as knowledge, attitudes, peers, family support, ease of access to cigarettes, and advertising promotion. Prevention of smoking behavior in adolescents should be a priority because it can have an impact on decreased study concentration and achievement to health problems. The prevalence of smokers of productive age actually causes a double burden such as non-communicable diseases, the burden of high medical costs due to this behavior, which is Rp. 17.9-27.7 trillion (5). Cigarettes are also a contributor to the high global mortality rate.

Cigarette promotion and sponsorship advertising (IPSR) in Indonesia is still massively carried out in various media. This is due to the weak tobacco control regulations, so Smoking Literacy Media (SML) efforts are needed. SML is a term that describes a person's analytical ability in understanding the real message about cigarettes in which there are authors, audiences, messages, goals, reality, and representations. The marketing of cigarette products that is quite ingenious through Corporate Social Responsibility / CSR Washing then makes digital media literacy mandatory for every individual from school age. This is motivated by exposure to pro-tobacco content that can trigger teenagers to use it in the future. The higher the SML owned by adolescents, the lower the potential for smoking behavior in the future (6).

School-based tobacco control was developed for 310 students in State High Schools and MAs in the Purwakarta District area with smoking media literacy (SML). The bound variable measured was smoking status and the independent variable was SML. As many as 14.2% of respondents were smokers, while the average SML value of respondents was only 68.94 out of a scale of 100. Respondents who had low SML had a 4.2 times greater risk of smoking (OR value = 4.262). This indicates that media literacy in students is relatively low. In line with this fact, another study also reported that of the 228 people who completed the health literacy questionnaire, as many as 32% of respondents had a low level of health literacy in Taiwan. More than a third admitted that it was difficult to access and assess information properly (7).

Based on the results of the 2022 Program for International Student Assessment (PISA) released by the Organization for Economic Cooperation and Development, the reading literacy score of Indonesian students decreased by 12 points from PISA in 2018. PISA also revealed that students were lagging behind by 117 points from the average global literacy score. Only 25.46% have reached the minimum competency standard (8). In fact, although digitalization opens up great opportunities for increasing literacy, its realization is a global challenge (9). In this case, the media plays an important role in facilitating the communication process in all fields, including health. All means or efforts made to display health messages that will be conveyed by communicators either in print, electronic, or outdoor form are referred to as health promotion media. The use of media in the literacy process is expected to help improve individual knowledge so that they are able to control risky behaviors that are detrimental to themselves and others (10).

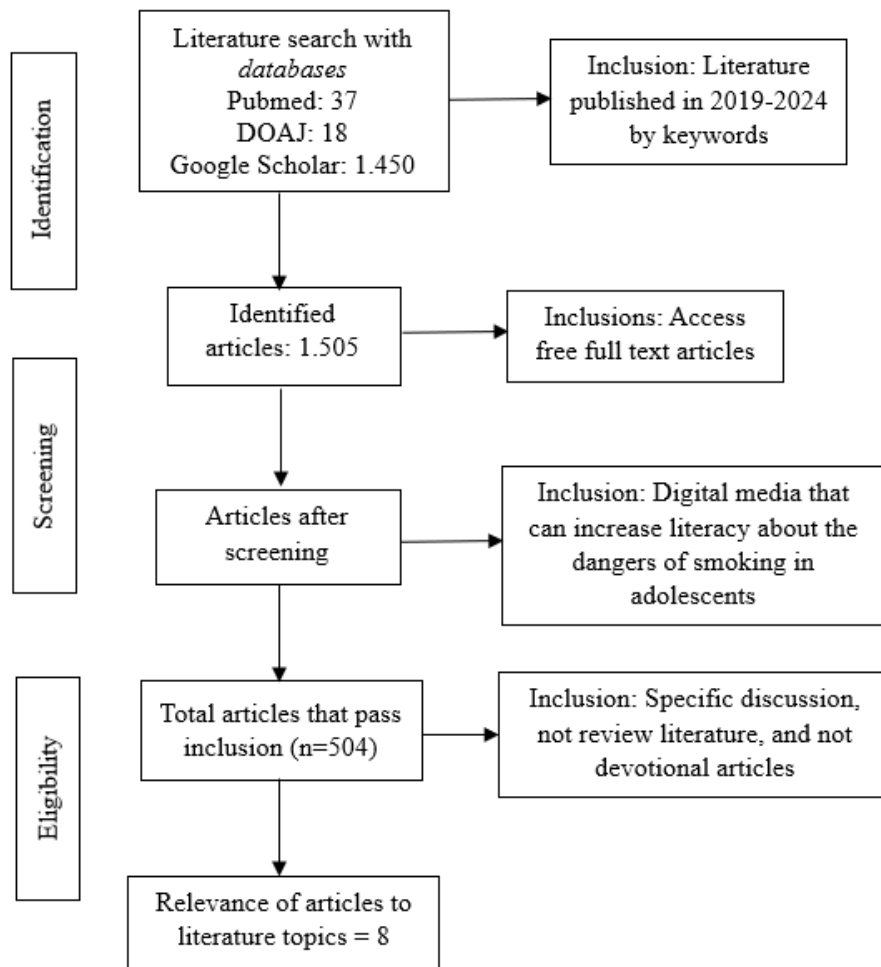
Adolescent health is a long-term investment that needs to be prioritized. This urgency stems from the fact that in adolescence, individuals will begin to learn to make independent decisions regarding their own health and that of others, including smoking behavior (11). Media-based health literacy is a special attraction in health promotion efforts because it can be useful as a disease prevention strategy from risky behaviors such as smoking habits. A Health Literacy and Tobacco Use Surveillance survey conducted on 1,120 male smokers in a city in Zhejiang Province in 2019 showed that only 24.8% of smokers had a high level of health literacy and intended to quit smoking (12). The broader concept of media literacy needs to be developed to help everyone understand health messages well so that they can make the right decisions (11). This review literature seeks to explore articles that discuss the

effectiveness of digital media in improving health literacy related to the dangers of cigarettes among adolescents from the variables that have changed.

**METHOD**

This research was carried out with literature studies from national and international journals published from 2019-2024. Using PubMed, DOAJ, and Google Scholar databases, researchers used the keywords "digital media", "literacy", "cigarettes", and "adolescents". A total of 37 articles were successfully found in PubMed, 18 articles in DOAJ, and 1,450 articles in Google Scholar. The results of the screening or selection are then included according to the criteria to facilitate analysis until 504 articles are obtained. Of these, the articles were studied in depth to see their relevance to the research topic and 8 articles were obtained for review (5 national articles, 3 international articles). The analysis continued with Preferred Reporting Items for Systematic Reviews an Meta-analyses (PRISMA).

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**Figure 1.** PRISMA Flowchart

**RESULTS**

After the search results were completed, eight articles of relevance were obtained according to the research topic. Furthermore, all articles are reviewed in detail and in-depth as presented in Table 1. Based on the table, it can be interpreted that digital media is effective in increasing health literacy from changes in various variables such as knowledge, attitudes, intentions, motivations, and behaviors.

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No.	Author	Title	Result
16 8	1. Anggelina et al., (2020)(13)	Analysis of the Effectiveness of 3D Animated Film Messages on the Dangers of Cigarettes Against Adolescent and Adult Active Smokers	The 3D animation film was developed as a media to socialize the dangers of smoking for adolescent and adult active smokers in the city of Pekanbaru. A total of 50 respondents were delimited in age ranges of 12-25 years and 26-45 years. The effectiveness of the dangers of smoking was measured using pre-test and post-test. The results showed that there was an increase in knowledge and intention to quit smoking that arose by 30% in the study respondents after watching 3D animated films
14 8	2. Adnani et al., (2021) (14)	The effectiveness of videos and leaflets in increasing knowledge and attitudes About the dangers of smoking in adolescents	Digital media videos and leaflets were used in health interventions on 70 male students at SMPN 2 Pandak Bantul. Knowledge indicators are based on the content, side effects and disadvantages of smoking. Meanwhile, the assumption of students to respond and accept the dangers of smoking is an indicator of the attitude measured. The measurement of the effectiveness of media use was carried out by pre-test and post-test and then passed the paired t-test. The results were obtained that there was a difference in knowledge in adolescents before and after being exposed to the dangers of smoking using videos and leaflets with a p-value of < 0.05.
2 3	3. Ismail, Siddiq, R, dan Bustami (2020)(15)	The Effectiveness of Health Education Using Audiovisual on the Santri Smokers' Motivation to Stop Smoking	Health education was carried out using audiovisual media for students at the Aceh Besar Traditional Islamic Boarding School which was divided into 4 groups, The risk of cancer in smokers was the theme that had the highest average motivation score for quitting smoking. The measurement of media effectiveness was carried out by pre-test and post-test with the average elementary ± for groups 1 to 4 being 11.52 ± 4.76, 15.39 ± 6.06, 22.57 ± 6.23, and 9.84 ± 6.42.
15	4. Dewi et al., (2021) (16)	Increasing Youth Knowledge About the Dangers of Cigarettes Electronics	Posters and short videos about the dangers of electronic cigarettes were used in the socialization of e-cigarette traps in two sub-districts in Banyuwangi. A total of 107 junior and senior high school students from 8 schools were measured for their knowledge of the content of e-cigarettes, wrong and developing opinions in society to how to avoid the trap of e-cigarettes. The effectiveness of socialization with both media was measured by pre-test and post-test. It was found that the average score of the respondents' knowledge increased by 0.88±1,499 (p=0.0004)
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28			

11	5. Park, E & Chang Y (2020) (17)	Using Digital Media to Empower Adolescents in Smoking Prevention: Mixed Methods Study	A total of 23 teenagers in Pontiac, Michigan, USA were empowered in several groups, where each group consisted of 3-5 people. They produced anti-smoking video clips whose messages contained the determinants of smoking, health consequences, and strategies for preventing and quitting smoking. The variables studied were intrapersonal, interactional, and behavioral domains. Effectiveness measurements were carried out by surveys, interviews, and wilcoxon tests before and after respondents made video clips. The results showed that the participants' psychological level increased significantly for all three domains with a p value of <0.05
24			
10	6. Wibowo et al., (2023)(18)	Internet-Based Flipbook as A Health Education Medium on The Dangers of Smoking for Teenagers	An internet-based flipbook entitled "Me, adolescents, and my health: healthy without tobacco" was developed to convey the message of the dangers of smoking to adolescents at Karang Taruna Imka (Ikatan Muda Mudi Kepek Satu) Bantul, DIY. A total of 35 adolescents were sampled to determine the effectiveness of flipbooks before and after use (pre-test and post-test). The results of the wilcoxon test and paired t-test showed that both variables had a sig value of 2 tailed <0.05 which means that it was effective in increasing adolescents' knowledge and attitudes towards the dangers of smoking
3			
9			
3			
7	7. Dharma et al., (2023) (19)	The Effect of Education Through Animated Video Media on Adolescents' Knowledge of the Dangers of Smoking at SMPN 2 Rancaekek, Bandung Regency	The animated video was developed as a digital intervention medium for the knowledge of 85 teenagers in grades 7 and 8 at SMPN 2 Rancaekek, Bandung Regency. The message conveyed was related to the dangers of cigarettes. Media effectiveness is measured through pre-test and post-test. The average value of respondents' knowledge before using animated videos was only 32.94. After using the animated video, the average score increased to 57.06
30			
6	8. Fathoni & Nisa (2024)(20)	Effect of Animated Video Media on Smoking Behavior Students in Junior High School Muhammadiyah 1 Purbolinggo Kabupaten Lampung Timur	An animated video on the dangers of smoking was used as an intervention medium to measure the knowledge, attitudes, and behaviors of 25 students at SMP 1 Muhammadiyah Purbolinggo, East Lampung. Media effectiveness was measured using pre-test and post-test scores processed with a dependent t-test. From the results of the analysis, a p value = 0.000 was obtained, which means that there was a change in the three variables in a positive direction (increased) after watching the animated video
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**DISCUSSION**

Nowadays, the problems experienced by adolescents are increasingly complex so that health literacy is urgently needed. High curiosity and peer influence make adolescents easily trapped in unhealthy behaviors, one of which is smoking. The content of harmful substances in cigarettes such as tar, nicotine, carbon monoxide, hydrogen cyanide, benzene, and so on has the potential to interfere with health. Not only the lungs are attacked, but also the liver, heart, intestines, and even the fetus in the womb. In addition, the nicotine content in cigarettes can cause an

opiate effect, so if teenagers dare to consume cigarettes, the possibility of alcohol and drug consumption will be more open (21).

The claim that cigarettes can overcome stress makes some teenagers interested in consuming them. Adolescents who are experiencing psychological distress have a 2x greater risk of smoking (22). However, the rapid development of technology can actually change the trend of digital media and communication platforms which also leads to changes in people's consumption patterns towards cigarettes. Content that shows smoking or marketing other tobacco products should be regulated. Not only applicable to the commercial category, but also personal (23) considering that the use of digital media is getting higher among teenagers.

Indonesian teenagers make up the bulk of the population, accounting for about 20% of the country's total population (24). As the younger generation, they will inherit responsibilities in all areas of life and governance. Therefore, it is important to intensively improve their understanding of the dangers of cigarettes. Adolescents are prime targets for health promotion because they are in the process of searching for identity and tend to try new things as part of their life experiences (25). This article discusses how digital media has an impact on the health literacy skills of the dangers of smoking among adolescents. Increasing knowledge, attitudes, motivations, and behaviors are indicators of assessing the effectiveness of the digital media studied.

In essence, health literacy can overcome various health problems. Not only is it limited to the ability to obtain and understand the information needed in appropriate health measures, but it can also shape healthy or unhealthy behaviors in daily life. There are three domains attached to health literacy, namely care, care, and health promotion. Meanwhile, health behaviors are derived again in several domains that include knowledge, attitudes, and actions (26). Given the negative impact of cigarettes on the younger generation (especially students), providing motivation to stop smoking needs to be prioritized. Health education, both through literacy and creative results in the arts, is one way that can be taken. Visual arts-based health education media can improve students' cognitive and behavioral abilities (27). Teenagers who are exposed to cigarettes indoors and at home are more susceptible to smoking than those who are not exposed. The small population of non-smoking teenagers in Indonesia then becomes important to maintain so that they do not become smokers in the future. (26).

Based on the results of the review of the eight articles, the effectiveness of dominant digital media was measured from the comparison of pre-test (before the intervention) and post-test (after intervention) scores. Only 1 article used a mix method (survey, interview, wilcoxon test) to measure media effectiveness. A higher post-test score than a pre-test indicates that the digital media used has a positive impact on the intervention target, namely adolescents. The effectiveness test of leaflet and video media was carried out on 70 young men at SMP 2 Pandak Bantul. The results showed that these two media were equally effective in increasing knowledge and changing respondents' attitudes towards cigarettes as measured by a higher post-test score than the pre-test with p-values of 0.002 and 0.001, respectively (14). Before the intervention, many respondents did not understand several things well, including: people who smoke directly are active smokers and cigarettes are also harmful to the health of others even though they are not active smokers.

Other video products are used by Dharma et al, as well as Fathoni and Nisa consecutively in 2023-2024 with the same form, namely animation. The average knowledge score of 85 teenagers in grades 7 and 8 at SMPN Rancaek, Bandung Regency, which was originally only 32.94, increased to 57.06 after watching the video (19). In line with these results, as many as 25 students at SMP 1 Muhammadiyah Purbolinggo East Lampung also experienced an increase in knowledge, attitude, and behavior with a significance value of  $<0.005$  (20).

Not only the variables above, motivation is also a variable that also increases when teenagers use audiovisual media. Students at the Aceh Besar Traditional Islamic Boarding School have a fairly high average motivation score for quitting smoking when knowing the risk of cancer in smokers. The average elementary school  $\pm$  in students in groups 1-4 was  $11.52 \pm 4.76$ ,  $15.39 \pm 6.06$ ,  $22.57 \pm 6.23$ , and  $9.84 \pm 6.42$  (15). Another audiovisual media that can be a reference for health promotion is film. 3D animated film on the dangers of cigarettes has been shown to be effective in increasing smoking cessation knowledge and intention in adolescent and adult active smokers by 30% (13).

The number of media used in health education is basically unlimited. In two sub-districts of the Banyuwangi area, posters and short videos were used simultaneously for online socialization of e-cigarette sales. The message conveyed was in the form of the content in the product, the misconceptions of opinion that developed in the community, and how to avoid the trap of this type of cigarette. After analysis, there was an increase in the average knowledge score of 107 junior and senior high school students from 8 schools by  $0.88 \pm 1,499$  after using both media ( $p=0.0004$ ) (16). If previous research used videos produced by researchers or outsiders, then things were done differently in Pontiac, Michigan, USA.

Teenagers in the USA are empowered to produce anti-smoking video clips in groups (1 group of 3-5 people). The messages conveyed included smoking determinants, health consequences, and strategies for preventing and quitting smoking. Researchers conducted surveys and interviews before and after respondents made video clips

2 which were then statistically tested using the wilcoxon test. Focusing on the intrapersonal, interactional, and behavioral domains, a p value of  $<0.05$  was obtained, which means that the psychological level of the respondents increased significantly (17). Another digital media product that is no less effective is internet-based flipbooks. A flipbook entitled "Me, teenagers, and my health: healthy without tobacco" was developed to convey the message of the dangers of smoking to 35 teenagers in Karang Taruna Imka (Ikatan Muda Mudi Kepek Satu) Bantul, DIY. The pre-test and post-test scores on the aspects of knowledge and attitude obtained after passing the statistical analysis had a sig value of 2 tailed  $<0.05$  (18).

9 This literature has presented various types of digital media that are able to increase health literacy about the dangers of cigarettes in adolescents with visual and audiovisual media categories. Audio-based media is still rarely used, so it is not known how effective it is. So far, audiovisual media, both ordinary videos, animations and movies, are claimed to be the most effective in influencing individual health literacy. The combination of audio, visual, and so on media will increase the involvement of sensory devices so that the absorption of information is more optimal (29). With good literacy skills, individual knowledge, intentions, and motivation will increase so that they can form healthier attitudes and behaviors without smoking.

## CONCLUSION

Digitalization is the gateway to increasing the number of health promotions in a more practical and modern way. Through the innovation of digital media on the right dangers of smoking, adolescents' interests and literacy skills are expected to improve. With a high level of literacy, adolescents' knowledge, attitudes, intentions, and motivation will also increase so that it can have implications for healthy living behaviors without smoking.

## SUGGESTION

Researchers in the future need to develop more innovative audiovisual-based health promotion media to obtain a high engagement rate so that the target reach is wider. Thus, the new media will be able to discourage and increase adolescents' understanding of the dangers of sustainable cigarettes.

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